

## PRELIMINARY GEOTECHNICAL INVESTIGATION

# Proposed Residential Development, 4134 16th Ave Markham, Ontario

#### Submitted to:

Sixteenth Land Holdings Inc. 9980 Kennedy Road, Suite 200 Markham, Ontario L6C 0M4

Attention: Mr. Glen Murphy and Mr. Frank Spaziani, P.Eng.

REPORT

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Figure 2 - Borehole Location Plan

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#### **APPENDIX A**

Important Information and Limitations of This Report

#### **APPENDIX B**

Additional Detailed Design Boreholes





### 1.0 INTRODUCTION

Sixteenth Land Holdings Inc. has retained Golder Associates Ltd. (Golder) to prepare this Preliminary Geotechnical Investigation Report in support of an Official Plan Amendment ("OPA") application to permit the development of a residential community on the subject property. The report was originally prepared as part of acquisition due diligence for the development team and has been updated to reflect the current draft plan of subdivision.

This report presents the results of a preliminary geotechnical investigation carried out by Golder at the above referenced site, as shown on the Key Plan, Figure 1. The purpose of the investigation was to obtain information on the general subsurface soil and shallow groundwater conditions at the site by means of a limited number of boreholes. Based on our interpretation of the borehole data, this report provides preliminary geotechnical information in support of the proposed residential development at the site.

The factual data, interpretations and preliminary recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, Golder should be given an opportunity to confirm that the preliminary recommendations are still valid. In addition, this report should be read in conjunction with the attached "Important Information and Limitations of This Report", included in Appendix A. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

#### 2.0 BACKGROUND

Golder previously carried out a preliminary geotechnical investigation for due diligence and acquisition purposes, a slope stability analysis, Phase I ESA and a Phase II ESA at the site. The results of which were presented in the following reports:

- "Preliminary Geotechnical Investigation, Acquisition Due Diligence, York Downs Golf and Country Club, 4134 16<sup>th</sup> Avenue, Markham, Ontario" Dated June 12, 2015;
- "Geotechnical Report, Slope Stability Analysis, York Downs Golf Club Redevelopment, Markham, Ontario"
   Dated May 3, 2016;
- "Phase I Environmental Site Assessments, 4134 16th Avenue, Markham, Ontario" Dated November 2014;
- "Phase II Environmental Site Assessment, 4134 16th Avenue, Markham, Ontario" Dated January 2015; and

This preliminary geotechnical investigation is an updated report based on the current preliminary draft plan.

#### 3.0 SITE DESCRIPTION

The property is municipally known as 4134 16<sup>th</sup> Avenue, in the City of Markham, Region of York. The property is located in Part lots 16, 17 and 18, Concession 5. Except for an area adjacent to Kennedy Road, the balance of the property is currently used by its former owner York Downs Golf & Country Club for a golf course.

The property is a total of 168.64 hectares (416.72 acres), and is located on the north side of 16<sup>th</sup> Avenue, on the west side of Kennedy Road, and has a small amount of frontage onto the east side of Warden Avenue as well. There is existing residential development surrounding the property on all sides.





Berczy Creek traverses the western portion of the property and Bruce Creek traverses the property in a roughly north/south direction, bisecting the property into west and east tableland areas.

The current golf course has been in operation since York Downs Golf & Country Club opened in the early 1970's. The current Official Plan designation of 'Private Open Space' for the areas outside of the valley lands reflects this historic golf course use.

Sixteenth Land Holdings Inc. intends to develop the property for a residential community and is submitting an OPA to re-designate the developable portion of the property from 'Private Open Space' to appropriate urban residential designations to permit the development of residential uses.

This report has been prepared in conjunction with the OPA application in support of the re-designation as proposed in the draft OPA and in the Planning Report (Gatzios Planning, August 2016). Please refer to the draft OPA and to the Planning Report for a description of the proposed Official Plan land use designations proposed for the property.

The proposed residential development is detailed in the two draft plan of subdivision applications that accompany this OPA application. There is one draft plan of subdivision for the east portion of the property and one for the west portion of the property. The west draft plan of subdivision also contains the valley lands associated with both Berczy Creek and Bruce Creek.

## 4.0 GEOLOGY

According to Chapman & Putnam "*The Physiography of Southern Ontario*" published by the Ministry of Natural Resources (Chapman & Putman, 1984) this site is located within the physiographic region of Southern Ontario known as the Peel Plain. In the area of the site, the Peel Plain is a bevelled till plain bordering with drumlins (Chapman & Putman, 1984, Map P.2715).

### 5.0 INVESTIGATION PROCEDURE

The field work for this preliminary investigation was carried out between November 18 to 20, 2014 and between December 5 and 17, 2014. During this time, 34 boreholes (Nos. 14-1 through 14-34) were advanced at the approximate locations shown on the Borehole Location Plan, Figure 2. The boreholes were drilled using a track-mounted drill rig supplied and operated by a specialist drilling contractor, subcontracted to Golder. Standard penetration testing (SPT) and sampling were carried out at regular intervals of depth in the boreholes using conventional 35 mm internal diameter split-spoon sampling equipment advanced using an automatic hammer or drop hammer. Ten 50 mm monitoring wells were installed in Boreholes 14-1, 14-2, 14-3, 14-8, 14-12, 14-15, 14-17, 14-29, 14-33 and 14-34. The remaining boreholes were backfilled and sealed upon completion of drilling in accordance with the current environmental regulations. All of the soil samples obtained during this investigation were brought to our Whitby laboratory for further examination, natural water content testing and selective soil classification testing.

The field work for this investigation was directed by a member of our engineering staff, who also logged the boreholes and cared for the recovered soil samples. The borehole locations were staked out in the field by Golder. The ground surface elevations at the location of the monitoring wells installed in Boreholes 14-1, 14-2, 14-3, 14-8, 14-15, 14-17, 14-29 and 14-33 were surveyed by J.D. Barnes Ltd., which are understood to be referenced to geodetic datum. The ground surface elevations at the remaining borehole locations were interpreted from topographic mapping provided by York Downs Golf & Country Club. As such, these elevations should be





considered approximate only. It is understood that the elevations provided on the topographic mapping are referenced to geodetic datum.

An additional 79 boreholes were advanced at the site as part of detailed design investigation. Boreholes 16-1 through 16-16 were advanced between February 22 and March 4, 2016. Boreholes 17-1 through 17-11 and 17-101 through 17-152 were advanced between March 7 and March 24, 2017. The location of these boreholes are shown on Figure 2 and the Record of Borehole sheets are included in Appendix B, following the text of this report. The subsurface conditions in the detailed design boreholes will be discussed in the detailed design report under separate cover.

#### 6.0 SUBSURFACE CONDITIONS

The subsurface soil and shallow groundwater conditions encountered in the boreholes, as well as the results of the field and laboratory testing are shown in detail on the Record of Borehole sheets following the text of this report. *Method of Soil Classification, List of Symbols* and *Abbreviations and Terms Used on Records of Boreholes and Test Pits* are provided to assist in the interpretation of the Record of Boreholes. It should be noted that the boundaries between the soil strata have been inferred from drilling observations and non-continuous samples. They generally represent a transition from one soil type to another and should not be inferred to represent an exact plane of geological change. Further, conditions will vary between and beyond the boreholes. The following is a summarized account of the subsurface conditions encountered in the boreholes drilled during this preliminary investigation, followed by more detailed descriptions of the major soil strata and shallow groundwater conditions.

For the 2014 preliminary design boreholes, underlying asphalt and concrete (maintenance area), topsoil and fill elsewhere on site, the native subsoils encountered were variable across the site. The subsurface soils generally consisted of shallow glaciolacustrine deposits of silty clay, clayey silt, sand, silty sand and sandy silt mostly overlaying glacial till. The glacial till ranged in gradation from silty sand till to silty clay till. Deposits of non-cohesive soils ranging in gradation from silty sand to gravelly sand were interlayered within the glacial till and encountered below the glacial till. Interlayers of cohesive soils ranging in gradation from clayey silt to silty clay and localized till-like deposits were also encountered within and below the glacial till deposits. Groundwater was measured during the investigation in the monitoring wells at depths ranging from 1.2 m to 5.9 m below ground surface.

# 6.1 Topsoil/ Topsoil Fill

Surficial topsoil or topsoil fill were encountered in all boreholes with the exception of Boreholes 14-1 to 14-8, 14-17, 14-31 and 14-34. The thickness of the topsoil ranged from approximately 25 mm to 690 mm. Topsoil was also found below the fill in Boreholes 14-9 and 14-14.

#### 6.2 Fills

Fill materials were encountered below the surficial topsoil fill in Boreholes 14-1, 14-2, 14-4, 14-7, 14-9, 14-17, 14-18, 14-19, 14-22, 14-25, 14-27, 14-28, 14-32 and 14-34. The fill consisted of variable materials ranging in gradation from silty sand to clayey silt as well as granular base materials related to asphalt or concrete pavements/slabs. The fills extended to depths ranging from approximately 0.1 m to 3.0 m below ground surface with a deep fill extending to about 4.6 m in the area of a service trench at Borehole 14-7. Borehole 14-7 was terminated within the fill at a depth of about 4.6 m. Standard penetration tests within the inorganic fill materials gave N values ranging from 3 blows to 23 blows per 0.3 m penetration. The in-situ water content of the fill samples ranged from about 4 percent to 29 percent.





## 6.3 Silty Clay to Clayey Silt

Deposits of silty clay to clayey silt were encountered in boreholes 14-4 to 14-6, 14-8 to 14-13, 14-15 to 14-17, 14-19 to 14-24, 14-26, 14-28, 14-31 and 14-33. Standard penetration tests carried out within the silty clay to clayey silt gave N values ranging widely from 3 blows to 36 blows per 0.3 m of penetration, indicating a soft to hard consistency. The natural water contents of the silty clay to clayey silt samples also ranged widely from about 10 percent to 42 percent. A single grain size distribution curve for a sample of silty clay is shown on Figure 3. The results of Atterberg limits tests completed on two (2) samples of the silty clay are shown on Figure 4 indicating that the silty clay can be classified as an inorganic clay of intermediate plasticity (CI soil type) under the Unified Soil Classification System.

## 6.4 Silty Sand, Sand, and Gravelly Sand

Non-cohesive strata, ranging in gradation from silty sand to gravelly sand were encountered in Boreholes 14-1 to 14-6, 14-8, 14-10 to 14-12, 14-14 to 14-16, 14-18 to 14-20 and 14-32 to 14-34. Standard penetration tests carried out within the silty sand to gravelly sand gave N values ranging widely from 4 blows to 45 blows per 0.3 m of penetration, indicating a loose to dense compactness. The natural water contents of the silty sand to gravelly sand samples also ranged widely from about 2 percent to 23 percent. Two grain size distribution curves for samples of silty sand are shown on Figure 5, and a single grain size distribution curve for a sample of gravelly silty sand is shown on Figure 6.

## 6.5 Silt and Sandy Silt

Deposits of silt and sandy silt were encountered in Boreholes 14-2 to 14-6, 14-13, 14-14, 14-18 and 14-20. Standard penetration tests carried out within the silt to sandy silt deposits gave N values ranging widely from 5 blows to 46 blows per 0.3 m of penetration, indicating a loose to dense compactness. The natural water contents of the silt samples also ranged widely from 9 percent to 27 percent. A single grain size distribution curve for a sample of silt is shown on Figure 7, and a single grain size distribution curve for a sample of sandy silt is shown on Figure 8.

## 6.6 Till-like Silty Clay to Till-Like Clayey Silt and Sand

Deposits of cohesive till-like silty clay to till-like clayey silt and sand were encountered in Boreholes 14-4, 14-12, 14-23, 14-25 and 14-30 to 14-32. Till-like deposits are characterized by having similar grain size distribution but lower N values (typically less than 10) than what would be typical of glacial tills.

Standard penetration tests carried out within the till-like silty clay to till-like clayey silt and sand gave N values ranging from 2 blows to 10 blows per 0.3 m of penetration, indicating a very soft to firm consistency. The natural water contents of the till-like samples ranged from about 11 percent to 34 percent. A single grain size distribution curve for a sample of till-like clayey silt and sand is shown on Figure 9.

# 6.7 Till-like Silty Sand

A deposit of a non-cohesive till-like silty sand was encountered overlying the silty sand till in Borehole 14-20. A single standard penetration test carried out within the till-like silty sand gave an N value of 9 blows per 0.3 m of penetration, indicating a loose compactness. The natural water content of the till-like silty sand sample was about 12 percent.





## 6.8 Silty Clay Till, Clayey Silt Till and Clayey Silt and Sand Till

Cohesive deposits of glacial till ranging in gradation from silty clay till to clayey silt and sand till were encountered in Boreholes 14-4 to 14-6, 14-9, 14-16 to 14-19, 14-21 to 14-31 and BH14-33. Cobbles and Boulders should be anticipated in this stratum as it is typical for Southern Ontario tills. Standard penetration tests carried out within the cohesive till gave N values ranging from 11 blows to greater than 100 blows per 0.3 m of penetration, indicating a stiff to hard consistency. The natural water contents of these till samples ranged from about 8 percent to 18 percent. A single grain size distribution curve for a sample of silty clay till is shown on Figure 10, and a single grain size distribution curve for a sample of clayey silt and sand till is shown on Figure 11.

## 6.9 Silty Sand Till

Non-cohesive deposits of non-cohesive silty sand till were encountered in Boreholes 14-10, 14-14, 14-15, 14-18, 14-19, 14-20, 14-22, 14-23 and 14-25. Cobbles and Boulders should be anticipated in this stratum as it is typical for Southern Ontario tills. Standard penetration tests carried out within the silty sand till gave N values ranging from 13 blows to 76 blows per 0.3 m of penetration, indicating a compact to very dense compactness. The natural water contents of the silty sand till samples ranged from 7 percent to 13 percent. Two grain size distribution curves for samples of silty sand till are shown on Figure 12.

## 6.10 Sandy Silt Till to Silt Till

Sandy silt till to silt till was encountered in Boreholes 14-2, 14-8, 14-17, 14-21, 14-22, 14-24, 14-25, 14-29 and 14-30. Cobbles and Boulders should be anticipated in this stratum as typical for Southern Ontario tills. Standard penetration tests carried out within the sandy silt till to silt till gave N values ranging from 11 blows to greater than 100 blows per 0.3 m of penetration, indicating a compact to very dense compactness. The natural water contents of the silty sand till to sandy silt till samples ranged from 7 percent to 12 percent.

#### 7.0 GROUNDWATER

Groundwater was encountered during drilling at depths ranging widely from 1.2 m to 7.1 m below existing ground surface. Seven of the boreholes were noted as being dry upon the completion of drilling.

The groundwater levels measured in the standpipes installed as part of this investigation are summarized in the following table:

	Approximate	Groundwater Level							
Standpipe	Ground Surface	November 18 to 20, 2014		December	17, 2014	January 5, 2015			
	Elevation (m ASL)	Depth (m BGS)	Elevation (m ASL)	Depth (m BGS)	Elevation (m ASL)	Depth (m BGS)	Elevation (m ASL)		
14-1	178.59	1.3	177.29	-	-	Frozen	-		
14-2	178.74	1.2	177.54	-	-	Frozen	-		
14-3	178.67	1.2	177.47	-	-	Frozen	-		
14-8	196.19	5.0	191.19	-	-	3.32	192.87		
14-12	179.48	-	-	0.92	178.56	1.49	177.99		
14-15	179.83	-	-	3.35	176.48	3.92	175.91		
14-17	194.43	-	-	2.47	191.96	2.50	191.93		
14-29	190.39	-	-	5.90	184.49	5.02	185.37		





	Approximate	Approximate Groundwater Level					
Standpipe	Ground Surface Elevation (m ASL)	November 18 to 20, 2014		December 17, 2014		January 5, 2015	
_		Depth (m BGS)	Elevation (m ASL)	Depth (m BGS)	Elevation (m ASL)	Depth (m BGS)	Elevation (m ASL)
14-33	194.67	-	-	3.21	191.46	3.22	191.45
14-34	180.4*	-	-	1.29	179.11*	1.17	179.23*

<sup>\*</sup> Elevation based on topographic mapping provided by York Downs Golf & Country Club. As such, these elevations should be considered to be approximate only.

It should be noted that these observations reflect the shallow groundwater conditions during the time of the field investigation and some seasonal fluctuations should be anticipated.

#### 8.0 DISCUSSION

This section of the report provides preliminary geotechnical information based on our interpretation of the limited borehole information and on our understanding of the project requirements. The information in this portion of the report is provided for draft plan approval and is not sufficient for final design or construction purposes. Once the actual development plans and pertinent design details are available, the results of this preliminary investigation should be reviewed by Golder and an additional project specific investigation carried out, as appropriate, compatible with the final development plans for the site.

Where comments are made on construction, they are provided only in order to highlight aspects of construction which could affect the design of the project. Contractors bidding on or undertaking any work at the site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction and make their own interpretation of the factual data as it affects their proposed construction techniques, schedule, equipment capabilities, costs, sequencing and the like.

Our professional services for this report address only the geotechnical (physical) aspects of the subsurface conditions at this site. The geo-environmental (chemical) aspects, including the consequences of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources, are outside of the terms of reference for this report and have not been addressed herein. However, as noted above, Golder has prepared a Phase I and II Environmental Site Assessments, the results of which were provided under a separate cover.

## 8.1 Project Description

Based on the preliminary draft plans provided, entitled "4134 16th Avenue Composite Plan" Drawing no. 1511-CP1 Prepared by The MBTW Group ("MBTW") dated August 22, 2016 and revised September 15, 2017, the proposed subdivision will consist of a residential component with associated residential roads and underground servicing, open space blocks, school blocks, medium residential blocks, and four Stormwater Management (SWM) Pond blocks. The subdivision is divided into two areas by Bruce Creek which are referred to as the "East Draft Plan" and "West Draft Plan". It is understood the subdivision will be fully serviced with municipal sanitary and storm sewers and watermains. Based on the preliminary site servicing and grading plans, it is understood that installation of the underground services will require excavations of up to about 5 m below the existing ground surface at our borehole locations. Further, based on the preliminary site servicing plans, the proposed development will require grade raises of up to about 4 m above the existing ground surface and grade cuts of up to about 1 m below the existing ground surface at our borehole locations to establish the site grading.





## 8.2 Preliminary Geotechnical Information

## 8.2.1 Topsoil Stripping and Reuse

The following geotechnical comments are provided regarding topsoil stripping and reuse at the site:

- Where appropriate, consideration may be given to selective stripping operations, consisting of road allowances and building envelopes (incl. driveways).
- Outside of road allowances and building envelopes, the topsoil may be buried and/or reused as general lot fill to raise grades subject to approval from the governing agency. The primary factor controlling methane generation is the organic carbon content of the topsoil. The loss on ignition (LOI) test provides an indication of the organic carbon content of the sample. Generally, an LOI value of less than 10 percent is considered to be acceptable in terms of methane generation potential. If topsoil is to be reused as general lot fill to raise grades, then LOI testing should be carried out.
- Stripping of the underlying organic stained layer would not be required in any site area from a geotechnical perspective. However, from a construction viewpoint, it may not be practical (or possible) for the contractor to distinguish between this zone and the overlying topsoil, especially if cuts of less than 150 mm are required.
- Where the topsoil is used as general lot fill, its thickness should be limited to about 1.5 m. The topsoil fill should be placed in maximum 300 mm loose lifts and uniformly compacted to 95 percent of standard Proctor maximum dry density. To have any success in placing topsoil as lot grading fill, it must be placed at or very close to its optimum water content to achieve workability and adequate compaction, in order to minimize post-construction settlements and/or lateral movements (e.g. of fences, etc.).

## 8.2.2 Engineered Fill

Based on the aforementioned plan drawings prepared by MBTW, it is understood that up to approximately 4.0 m of engineered fill will be required to establish the general site grading in some areas. Prior to placing engineered fill at the site, all topsoil, any existing septic systems, wells, old foundations and existing fill must first be removed from the development area. It should be noted that undocumented fill materials were encountered in Boreholes 14-1, 14-2, 14-4, 14-7, 14-9, 14-17, 14-18, 14-19, 14-22, 14-25, 14-27, 14-28, 14-32 and 14-34. The existing fill consisted of variable materials ranging in gradation from silty sand to clayey silt as well as granular materials related to asphalt or concrete pavements/slabs. The fills extended to depths ranging from approximately 0.1 m to 3.0 m below ground surface with a deep fill extending to 4.6 m in the area of a service trench at Borehole 14-7. The fill material is not considered to be suitable to support house foundations or any other settlement sensitive structures and must be completely removed from the proposed building envelopes and replaced using engineered fill.

The exposed native subgrade area(s) should then be heavily proofrolled in conjunction with an inspection by the geotechnical engineer, to confirm that the exposed soils are native, undisturbed and competent, and have been adequately cleaned of ponded water and all disturbed, loosened, softened, organic and other deleterious material. Remedial work (i.e., further sub-excavation and replacement) should be carried out as directed by the geotechnical engineer.





Materials for reuse as engineered fill must be approved by Golder prior to placement. In this regard, excavated native soils from the site, free of significant amounts of organics and other deleterious materials, may be reused as engineered fill. The existing fill material would also be suitable for use as engineered fill provided the organics and any other deleterious materials can be removed from the fill and provided that the fill can be brought to within 2 percent of the optimum water content for compaction. Based on the measured natural water contents, the majority of the native glacial tills and non-cohesive silty/sandy soils above the local water table are generally near their estimated laboratory optimum water contents for compaction. However, the non-cohesive silt to silty sand and sand soils below the local water table and majority of the soft to stiff clayey soils are expected to be wet of their laboratory optimum water contents. These soils will likely require some drying prior to placement. Such fine grained soils may be difficult to adequately dry for use as engineered fill and may be considered for reuse as non-structural fill (i.e. in landscaping areas). It should also be noted that due to the fine-grained nature of the predominant clayey and silty subsoils, their workability is sensitive to moisture conditions and some difficulty would be expected in achieving adequate compaction during wet weather.

Imported materials to be used for engineered fill must be approved by Golder at the source(s), prior to hauling to the site. In this regard, imported sandy materials which generally meet the requirements for OPSS Select Subgrade Material (SSM) would be suitable for use as engineered fill. In any event, the approved materials for engineered fill should be placed in maximum 300 mm loose lifts and uniformly compacted to at least 98 percent of Standard Proctor Maximum Dry Density (SPMDD) throughout. The placement of engineered fill should be monitored by Golder on a full-time basis during placement.

The engineered fill footprint should extend to a minimum of 1 m outside the building envelope (in all directions) plus an equivalent of the depth of the engineered fill all around. Engineered fill slopes and any native cut slopes that will become permanent slopes at the development, if any, should be 2H:1V or flatter, and should be covered with topsoil and sodded or otherwise treated to reduce surface erosion. Maintenance will be required over the first several years until the vegetative mat has taken root.

The final surface of the engineered fill should be protected as necessary from construction traffic, and should be sloped to provide positive drainage for surface water during and following the construction period. During periods of freezing weather, additional soil cover should be placed above final subgrade to provide for frost protection. Prior to placing any additional engineered fill, the surface of the existing engineered fill must be re-inspected by the geotechnical engineer.

#### 8.2.3 Consolidation Settlement

Deposits of compressible silty clay/clayey silt and till-like materials were encountered in Boreholes 14-4, 14-5, 14-6, 14-12, 14-13, 14-21, 14-23, 14-24, 14-25 and 14-31. These soils will be subject to consolidation settlement under loading. It should be noted, as part of this preliminary geotechnical investigation, consolidation settlement analysis was not carried out. As such, at the time of detailed design, additional boreholes and testing will be required to further define the limits of these areas as well as the soil strength, consolidation settlement potential and if applicable, preloading requirement. In this regard, installation of underground services, foundations, pavements and other settlement sensitive structures must be delayed until sufficient degree of consolidation settlement has occurred.





### 8.2.4 Excavation for Site Servicing

As noted above, it is anticipated that the proposed watermain, sanitary and storm sewer installations will require trench excavations up 5.0 m in depth below the existing road/ground surface. The finalized design pipe alignments and invert elevations are not available at this time. As such, the following generalized geotechnical information and recommendations are provided at this time to facilitate the detail design process. Once the finalized watermain and sewer alignments and invert depths are available, these recommendations should be reviewed and amended by the Golder, as required. Additional investigations should be carried out in identified areas of insufficient subsurface information.

Based on the results of this investigation, the founding soils for the services are likely to be variable and generally consist of engineered fill, silty clay/clayey silt, or clayey/silty tills or till-like deposits and non-cohesive sand and silt to silty sand. These subsoils are considered to be generally suitable for supporting the pipes, provided the integrity of the base can be maintained during construction. The till-like silty clay/clayey silt or soft clayey soil can also be used for the support of the pipes, however, additional bedding, in the order of 300 mm to 450 mm, may be required, as directed by Golder during construction. Some difficulty may be encountered in excavating the dense/hard tills at some locations. In addition, these tills are expected to contain cobbles and boulders, as previously noted.

Based on the groundwater conditions encountered in the boreholes, monitoring wells and standpipes, the pipes will generally be at or below the local water table at most locations. Groundwater control during excavation within the silty/clayey subsoils and tills at the site can be handled, as required, by pumping from properly constructed and filtered sumps located within the excavations. However, more significant groundwater seepage should be expected from the wet non-cohesive silty/sandy and granular deposits and fills (i.e. within vicinity of Boreholes 14-4, 14-7, 14-8, 14-13, 14-19, 14-20 and 14-32) where encountered. Depending upon the actual thickness and extent of these wet non-cohesive silty/sandy and granular deposits and the finalized design pipe invert depths, some form of positive (active) groundwater control may be required to maintain the stability of the base and side slopes of the trench excavations in these areas, in addition to pumping from sumps. In any case, the groundwater level should be lowered to a minimum of 1 m below the invert of the pipes in advance of the excavation reaching the invert levels.

In any event, it would be prudent to carry out a "public digging" (i.e. test pitting) during the tender stage, to allow prospective bidders to assess the subsurface conditions and determine the type of groundwater control required, consistent with their equipment capabilities and the actual groundwater conditions at that time. The locations of the test pits should be determined in consultation with Golder.

Water takings in excess of 50,000 L/day are regulated by the MOECC. Certain takings of groundwater and stormwater for construction dewatering purposes with a combined total less than 400,000 L/day qualify for self-registration on the MOECC's Environmental Activity and Sector Registry (EASR). Registry on the EASR replaces the need to obtain a PTTW for water taking and a Section 53 approval for discharge of water to the environment. A "Water Taking Plan" and a "Discharge Plan" are required by the MOECC if water is taken in accordance with an EASR. In all cases, discharge under the EASR must be in accordance with a Discharge Plan (to be developed by a qualified professional). The contractor will be responsible for obtaining any required discharge approvals. A Category 3 PTTW would be required for water takings in excess of 400,000 L/day. Once the underground utility inverts are finalized, an assessment for the need for the PTTW should be carried out by the project hydrogeologist in conjunction with the geotechnical engineer.





It is anticipated that the trench excavations will consist of conventional temporary open cuts with side slopes not steeper than 1 horizontal to 1 vertical (i.e. for Type 3 soils). However, depending upon the construction procedures adopted by the contractor, groundwater seepage conditions and weather conditions at the time of construction, some local flattening and/or blanketing of the slopes may be required, especially where localized seepage is encountered. In particular, excavation into soft and very soft silty clay and till-like soils (vicinity of Boreholes 14-4, 14-6, 14-12, 14-13, 14-21, 14-25 and 14-31) will require utilization of some form of trench support or side slopes no steeper than 3 horizontal to 1 vertical (3:1) as these soft soils are classified as Type 4 under the Occupational Health and Safety Act and Regulations for construction project.

Depending on the proposed elevations of the services basal instability may be encountered in the soft clayey silt, silty clay or till-like clayey silt and till-like silty clay, depending on the final grade elevations and the geometry of the trench. It would be prudent at the time of construction to carry out periodic in situ vane shear tests at the base of the excavations to confirm the results of the boreholes and to provide basis for prediction of basal instability so that appropriate steps can be taken during construction to mitigate or minimize its effects. As a preventive measure, in the event of potential basal instability, the excavated material should be placed well back from the edge of the excavation to minimize surcharge loading near the excavation crest. The trench in these areas should also be backfilled as soon as possible. Other methods may be recommended depending on the severity of the potential for instability.

Where side slopes of excavations are required to be steepened to limit the extent of the excavation, then some form of approved trench support system may be required. It must be emphasized that a trench liner box provides protection for construction personnel but does not provide any lateral support for the adjacent excavation walls, underground services or existing structures. It is imperative that any underground services or existing structures adjacent to the excavations be accurately located prior to construction and adequate support provided where required. In addition, steepened excavations should be left open for as short a duration as possible and completely backfilled at the end of each working day. Care should be taken to direct surface runoff away from the open excavations and all excavations should be carried out in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects.

#### 8.2.5 Pipe Bedding and Cover

The bedding for watermains and sewers should be compatible with the type and class of pipe, the surrounding subsoil and anticipated loading conditions and should be designed in accordance with the Municipal and Regional standards. Where granular bedding is deemed to be acceptable, it should consist of at least 150 mm of OPSS Granular A or 19 mm crusher run limestone material. Depending upon the finalized design pipe invert depths and founding conditions, additional bedding (i.e. 300 to 450 mm in total) may be required in overly wet zones or soft clayey soils. From springline to 300 mm above obvert of the pipe, sand cover may be used. All bedding and cover materials should be placed in maximum 150 mm loose lifts and should be uniformly compacted to at least 98 percent of standard Proctor maximum dry density.

Clear stone bedding material should not be used in any case for pipe bedding or to stabilize the base unless specifically directed in the field by the Golder.





#### 8.2.6 Trench Backfill

The excavated materials from the site will be variable, ranging from sandy/silty (non-cohesive) soils to clayey (cohesive) soils. The majority of the shallow subsoils from above the local water table as well as the underlying glacial till materials, are generally near their estimated optimum water contents for compaction and may be reused for trench backfill. The other excavated soils (silty clay, clayey silt, the till-like soils and non-cohesive silty/sandy soils) from at or below the local water table are generally wet of their estimated optimum water contents for compaction and may require some drying prior to placement. In this regard, depending upon schedule and weather conditions, it may not be practical to effectively dry the excavated wet till-like silty clay or wet upper till and silty materials in the field, for reuse as trench backfill. The excavated subsoils at suitable water contents may be reused as backfill provided they are free of significant amounts of topsoil, organics or other deleterious material and are placed and compacted as outlined below. All topsoil, existing fill and organic materials should be wasted or used for landscaping purposes.

Trench backfill, from the top of the cover material to 1 m below subgrade elevation, should be placed in maximum 450 mm loose lifts and uniformly compacted to at least 95 percent of SPMDD. From 1 m below subgrade to subgrade elevation, the materials should be placed in maximum 300 mm loose lifts and uniformly compacted to at least 98 percent of SPMDD.

Alternatively, if placement water contents at the time of construction are too high, or if there is a shortage of suitable in-situ material, then an approved imported granular material which meets the requirements for OPSS Select Subgrade Material (SSM) could be used. It should be placed in loose lift thicknesses and uniformly compacted as indicated above. Backfilling operations during cold weather should avoid inclusions of frozen lumps of material, snow and ice.

Normal post-construction settlement of the compacted trench backfill should be anticipated, with the majority of such settlement taking place within about 6 months following the completion of trench backfilling operations. This settlement will be reflected at the ground surface and may be compensated for, where necessary, by placing additional granular material prior to asphalt paving. Alternatively, if the asphalt binder course is placed shortly following the completion of trench backfilling operations in these areas, any settlement that may be reflected by subsidence of the surface of the binder asphalt should be compensated for by placing an additional thickness of binder asphalt or by padding. If scheduling permits, the surface course asphalt should not be placed over the binder course asphalt for at least 12 months.

It should be noted that in some cases, even though the compaction requirements have been met, the subgrade strength in the trench backfill areas may not be adequate to support heavy construction loading, especially during wet weather or where backfill materials wet of optimum have been placed. In any event, the subgrade should be proofrolled and inspected by Golder prior to placing the Granular B subbase and additional subbase material placed, as required and as determined in the field by Golder, consistent with the prevailing weather conditions and anticipated use by construction traffic.





### 8.2.7 Soil Bulking

Soil bulking is the increase in total volume of soil over the volume of the same material in the undisturbed state. Bulking of native soils occurs when they are excavated from undisturbed ground. It should be noted that due to the variability of the soils on the site, the actual soil bulking factor can be best determined when the final site grading plan is available and a series of additional laboratory and in-situ field tests are completed on the proposed "cut" soils. However, for initial design purposes and considering the soils at this site, bulking of about 10 percent (increase in total volume) would be expected after excavation and prior to re-compaction. After re-compaction, bulking of about 5 percent would be expected.

#### 8.2.8 Trench Plugs

It is recommended that, where the utility trench encounters low permeability cohesive soils, trench plugs should be constructed to prevent preferential water flow through the granular bedding and trench backfill. These clay plugs could be constructed using excavated cohesive material or manufactured clay plugs. The need for and frequency of trench plugs must be evaluated during detailed design.

#### 8.2.9 Residential Foundations

Based on the results of this investigation, the subsurface soil conditions are variable throughout the site. The grading plan has not been finalized at the time of the report preparation. However, conventional light residential houses/townhouses with basements may be founded on conventional shallow spread and/or continuous strip footings bearing in the native, undisturbed soils or on engineered fill at most locations. Actual allowable bearing capacities should be carefully considered at the detailed design stage in consultation with the geotechnical engineer. They will vary from 50 kPa to 150 kPa based on location, grading and actual founding elevations. Where soft and compressible clayey soils are present, the areas may require preloading as discussed in Section 8.2.3 prior to any footing construction.

In general, a preliminary allowable bearing capacity of 100 kPa to 150 kPa for 25 mm of settlement may be assumed for conventional shallow spread and/or strip footings bearing in the native, undisturbed competent subsoils (below any fill) at a depth of approximately 1.3 m below the existing ground surface (or deeper as required for basements) in most areas. It should be noted that zones of soft to stiff silty clay and clayey silt and till-like clayey silt or silty clay were encountered in Boreholes 14-4, 14-5, 14-6, 14-8, 14-12, 14-13, 14-15, 14-19, 14-20, 14-21, 14-23, 14-24, 14-25 and 14-31 at depths of up to 3.7 m. In the majority of these locations these soils were found immediately below the topsoil or shallow fill. Where these soils extend below a depth of 1.3 m below the existing ground surface (Boreholes 14-5, 14-6, 14-12, 14-23, 14-24 and 14-25) a reduced allowable bearing capacity in the order of 50 kPa to 75 kPa will likely be required. In addition, these soils may be subject to consolidation settlement under loading if grade raises are required. Again, once the final grading and the founding elevations are established, the design allowable bearing capacities should be reviewed and additional recommendations made at that time.

Footings bearing on or within approved engineered fill should have a minimum width of 450 mm and may also be designed using an allowable bearing pressure of 150 kPa, provided that the bases of these footings are a minimum of 1 m above the interface of the engineered fill and native soils. The allowable bearing pressure for footings founded within the engineered fill that are within 1 m of the underlying native soils, should be evaluated in the field by Golder on a case by case basis.





All foundation excavations at the site should be carried out in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. The founding materials are susceptible to disturbance by construction activity especially during wet weather and care should be taken to preserve the integrity of the materials as bearing strata. Prior to pouring concrete for the footings, the foundation excavations should be inspected by the geotechnical engineer to confirm that the footings are founded within an undisturbed and competent bearing stratum that has been cleaned of ponded water and all disturbed, softened, loosened, organic and other deleterious material. Due to the variability of the subsurface conditions at the site, it is **essential** that all footings for all houses be inspected and bearing capacities confirmed in the field by Golder prior to pouring concrete. If the concrete for the footings on the native soil cannot be placed immediately after excavation and inspection, it is highly recommended that a working mat of lean concrete be placed in the excavation immediately to protect the integrity of the bearing stratum. As such, additional sub excavation should be carried out to allow for the placement of the working mat.

In general, for any houses placed wholly or in part on engineered fill, it is recommended that the foundation walls be provided with nominal reinforcement with reinforcing steel at the top and bottom of the foundation walls. This could typically consist of two 10 M bars in the top and two 10 M bars in the bottom of the walls. The bars should be placed as close as possible allowing for at least 50 mm of cover. Corner bars should have proper factory bends and all tied steel should have at least 600 mm of overlap. At window well locations, two 10 M bars should be placed in the foundation wall as close to the sill as possible (allowing for 50 mm of cover). The bars should extend laterally at least 600 mm beyond the edge of the window opening. The actual design should be approved by the home builder's structural engineer.

The perimeter house basement walls should be backfilled with a free draining, non-frost susceptible granular material carefully placed and compacted in lifts. The walls should be designed using a lateral earth pressure coefficient at rest,  $k_0$ , of 0.5 and a unit weight of backfill of 21 kN/m<sup>3</sup>. Alternatively, where site excavated material is to be reused for exterior basement wall backfill, an approved geocomposite drainage system should be used directly against the wall. The upper 0.3 m of backfill should be clayey material to provide a relatively impermeable cap and should be sloped away from the house. Properly filtered perimeter drains at foundation level leading to a permanent outlet, such as a continuously pumped sump or a direct outlet to a sewer line, should be provided.

It is suggested that finalized basement floor elevations should be set above the local water table where possible. Underfloor drains and upgraded level of water-proofing would be necessary in areas of the site if basements are proposed to be both located <u>below</u> the local groundwater table <u>and</u> in potentially water bearing soils (i.e. primarily sandy soils). Such conditions should be identified in the field Golder during construction.

Where spread footings are constructed at different elevations, the difference in elevation between the individual footings should not be greater than one half the clear distance between the footings. In addition, the lower footings should be constructed first so that if it is necessary to construct the lower footings at a greater depth than anticipated, the elevation of the upper footings can be adjusted accordingly. Stepped strip footings should be constructed in accordance with the 2012 Ontario Building Code, Section 9.15.3.9.

All exterior footings and footings in unheated areas should be provided with at least 1.3 m of soil cover after final grading, in order to minimize the potential for damage due to frost action. In addition, the bearing soil and fresh concrete should be protected from freezing during cold weather construction.





#### 8.2.10 Pavement Consideration

Based on the subsoil conditions encountered in the boreholes, conventional asphaltic (flexible) pavement designs are considered to be appropriate for the proposed subdivision roadways. Details of the pavement design can be provided during detailed design once the roadway configuration, traffic data and site grading are available.

## 8.2.11 Stormwater Management Ponds

Based on the draft plan drawings provided to Golder, it is understood that the proposed development will include four stormwater management pond blocks. Based on these plans, it should be noted that the boreholes drilled for the preliminary geotechnical investigation contain insufficient geotechnical and hydrogeological information for the pond design or review purposes. In all cases, the current groundwater levels are above the proposed pond base elevations and as such, pond liners are currently being considered by the design team. In this regard, geotechnical best practice is to install a liner only in cases where the liner will provide a lower hydraulic conductivity than the existing soils at the SWM pond location. In general, the soils at the locations of the Block 2, Block 5, and Block 6 SWM ponds are low hydraulic conductivity and will likely not require a liner for geotechnical purposes. The soils encountered at the location of the proposed SWM pond in Block 3 are more granular with higher hydraulic conductivity and thus may require a liner.

Additional details regarding the existing soils at the base elevation of the proposed SWM ponds, and recommendations for the requirement and construction of a liner will be provided at the detailed design stage. It is recommended that a test pit investigation be conducted at the time of construction to confirm the hydraulic conductivity of the soil. Where sand seams are observed in the base and sides of the SWM pond during construction, the seams should be sub excavated and replaced with properly compacted clay.

## 8.2.12 Slope Stability Analysis for Bruce Creek Valley Slopes

Golder carried out a geotechnical setback analysis and slope investigation, the results of which were presented in our report entitled "Geotechnical Report, Slope Stability Analysis, York Downs Golf Club Redevelopment, Markham, Ontario" Dated May 3, 2016. This report should be read in conjunction with our aforementioned report.





## 9.0 CLOSURE

As previously indicated, the preliminary geotechnical recommendations provided in this report are prepared for draft plan approval process. Once the final development plans are available, the information in this report should be reviewed by Golder and the recommendations updated with the detailed design boreholes drilled in 2016 and 2017.

We trust that this report provides sufficient preliminary geotechnical engineering information to aid in the planning and preliminary design of the proposed residential development at the site. If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact this office.

Yours truly,

**GOLDER ASSOCIATES LTD.** 

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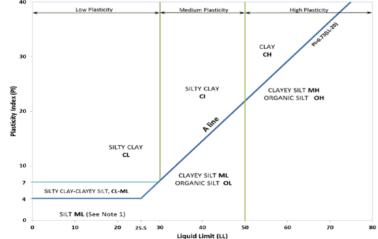




#### METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group		of Soil	Gradation or Plasticity		$=\frac{D_{60}}{D_{10}}$		$Cc = \frac{(D)}{D_{10}}$	$\frac{(30)^2}{(2D_{60})}$	Organic Content	USCS Group Symbol	Group Name													
		of is nm)	Gravels with ≤12%	Poorly Graded		<4		≤1 or≥	:3		GP	GRAVEL													
(ss)	5 mm)	GRAVELS 3% by mass rrse fraction r than 4.75 r	fines (by mass)	Well Graded		≥4		1 to 3	i.		GW	GRAVEL													
by ma	SOILS an 0.07	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with >12%	Below A Line			n/a				GM	SILTY GRAVEL													
SANIC t ≤30%	AINED rger th	(> cc larg	fines (by mass)	Above A Line			n/a			≤30%	GC	CLAYEY GRAVEL													
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	of is mm)	Sands with ≤12%	Poorly Graded		<6		≤1 or ≥	:3	≥30%	SP	SAND													
ganic (	COARS by ma	SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	fines (by mass)	Well Graded		≥6		1 to 3	3		SW	SAND													
Ö.	(>50%	SAN 50% by parse fr	Sands with >12%	Below A Line			n/a				SM	SILTY SAND													
		smal	fines (by mass)	Above A Line			n/a				SC	CLAYEY SAND													
Organic	Call			,		Laboratory	Field Indicators				Organic		Duimour												
or Inorganic			of Soil	Laboratory Tests	Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)	Content	USCS Group Symbol	Primary Name													
		L plot		Liquid Limit	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT													
(ss	75 mm	and L	S I and L Line city Iow)	below A-Line On Plasticity Chart below)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT													
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS	OILS an 0.07	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity		art be	Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT												
SANIC S30%	FINE-GRAINED SOILS mass is smaller than 0.	(Non-Plast		n-Plast	-Plasti	n-Plasti	n-Plasti	-Plasti	-Plasti	-Plasti	-Plasti	-Plasti	-Plasti	η-Plasti	n-Plast be or Ch	Plasti bel on Ch,	n-Plast be or Ch	Liquid Limit	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	МН
INORGANIC	-GRAII			≥50	None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	ОН	ORGANIC SILT													
ganic (	FINE	olot	e on lart	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0%	CL	SILTY CLAY													
Ő	9 %09:	CLAYS	A-Line city Ch elow)	Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium	to 30%	CI	SILTY CLAY													
	A)		CLAYS (Pl and LL plot above A-Line on Plasticity Chart below)	Liquid Limit ≥50	None	High	Shiny	<1 mm	High	(see Note 2)	СН	CLAY													
ALY ANIC LS	anic : >30% ass)		mineral soil tures							30% to 75%		SILTY PEAT, SANDY PEAT													
HIGHLY ORGANIC SOILS	Peat and mineral soil mixtures  Predominantly peat, may contain some mineral soil, fibrous or amorphous peat					_			75% to 100%	PT	PEAT														



Note 1 - Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are

Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

**Dual Symbol** — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.

For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.

For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

**Borderline Symbol** — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML. A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.



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# ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

#### PARTICLE SIZES OF CONSTITUENTS

	4		
Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

#### MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (i.e., SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

#### PENETRATION RESISTANCE

#### Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

#### **Cone Penetration Test (CPT)**

An electronic cone penetrometer with a  $60^\circ$  conical tip and a project end area of  $10~\text{cm}^2$  pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q<sub>i</sub>), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

#### Dynamic Cone Penetration Resistance (DCPT); N<sub>d</sub>:

The number of blows by a  $63.5 \, \text{kg}$  (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter,  $60^{\circ}$  cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

#### NON-COHESIVE (COHESIONLESS) SOILS

# Compactness² Term SPT 'N' (blows/0.3m)¹ Very Loose 0 - 4 Loose 4 to 10 Compact 10 to 30 Dense 30 to 50 Very Dense >50

- SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
- 2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average  $N_{60}$  values.

#### **Field Moisture Condition**

Term	Description			
Dry	Soil flows freely through fingers.			
Moist	Soils are darker than in the dry condition and may feel cool.			
Wet	As moist, but with free water forming on hands when handled.			

#### **SAMPLES**

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
GS	Grab Sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

#### **SOIL TESTS**

w	water content
PL, w <sub>p</sub>	plastic limit
LL, w <sub>L</sub>	liquid limit
С	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test1
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement <sup>1</sup>
D <sub>R</sub>	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
М	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO <sub>4</sub>	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

 Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.
 COHESIVE SOILS

#### Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N' <sup>1,2</sup> (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

- SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
- enects; approximate only.

  2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

#### **Water Content**

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

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## **LIST OF SYMBOLS**

Unless otherwise stated, the symbols employed in the report are as follows:

l.	GENERAL	(a) w	Index Properties (continued) water content
π	3.1416	w <sub>i</sub> or LL	liquid limit
In x	natural logarithm of x	w <sub>p</sub> or PL	plastic limit
log <sub>10</sub>	x or log x, logarithm of x to base 10	l <sub>p</sub> or PI	plasticity index = $(w_l - w_p)$
g	acceleration due to gravity	Ws	shrinkage limit
ť	time	ال	liquidity index = $(w - w_p) / I_p$
		Ic	consistency index = $(w_l - w) / I_p$
		<b>e</b> max	void ratio in loosest state
		<b>e</b> min	void ratio in densest state
		l <sub>D</sub>	density index = $(e_{max} - e) / (e_{max} - e_{min})$
II.	STRESS AND STRAIN		(formerly relative density)
γ	shear strain	(b)	Hydraulic Properties
Δ	change in, e.g. in stress: Δ σ	h	hydraulic head or potential rate of flow
3	linear strain	q	
εν	volumetric strain	V i	velocity of flow hydraulic gradient
η	coefficient of viscosity Poisson's ratio	k	hydraulic gradient hydraulic conductivity
υ	total stress	N.	(coefficient of permeability)
σ σ'	effective stress ( $\sigma' = \sigma - u$ )	j	seepage force per unit volume
$\sigma'_{vo}$	initial effective overburden stress	J	coopage force per affic volume
	principal stress (major, intermediate,		
01, 02, 00	minor)	(c)	Consolidation (one-dimensional)
	,	Cc	compression index
$\sigma_{\text{oct}}$	mean stress or octahedral stress		(normally consolidated range)
	$= (\sigma_1 + \sigma_2 + \sigma_3)/3$	$C_{r}$	recompression index
τ	shear stress		(over-consolidated range)
<u>u</u>	porewater pressure	Cs	swelling index
E	modulus of deformation	$C_{\alpha}$	secondary compression index
G K	shear modulus of deformation	m <sub>v</sub>	coefficient of volume change coefficient of consolidation (vertical
K	bulk modulus of compressibility	Cv	direction)
		Ch	coefficient of consolidation (horizontal direction)
	COU DECEMBED	Τ <sub>ν</sub>	time factor (vertical direction)
III.	SOIL PROPERTIES	U -'	degree of consolidation pre-consolidation stress
(a)	Index Properties	σ′ρ OCR	over-consolidation ratio = $\sigma'_p / \sigma'_{vo}$
<b>(α)</b> ρ(γ)	bulk density (bulk unit weight)*	OCK	over-consolidation ratio = 8 p / 8 vo
ρα(γ <sub>d</sub> )	dry density (dry unit weight)	(d)	Shear Strength
$\rho_w(\gamma_w)$	density (unit weight) of water	τ <sub>p</sub> , τ <sub>r</sub>	peak and residual shear strength
ρs(γs)	density (unit weight) of solid particles		effective angle of internal friction
γ'	unit weight of submerged soil	φ' δ	angle of interface friction
·	$(\gamma' = \gamma - \gamma_w)$	μ	coefficient of friction = $tan \delta$
$D_R$	relative density (specific gravity) of solid	C'	effective cohesion
	particles ( $D_R = \rho_s / \rho_w$ ) (formerly $G_s$ )	$C_{u},S_{u}$	undrained shear strength ( $\phi = 0$ analysis)
е	void ratio	р	mean total stress $(\sigma_1 + \sigma_3)/2$
n	porosity	p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
S	degree of saturation	q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
		q <sub>u</sub>	compressive strength ( $\sigma_1$ - $\sigma_3$ )
		St	sensitivity
	ity symbol is $\rho$ . Unit weight symbol is $\gamma$	Notes: 1	$\tau = c' + \sigma' \tan \phi'$
	e $\gamma = \rho g$ (i.e. mass density multiplied by leration due to gravity)	2	shear strength = (compressive strength)/2



February 2017 3

LOCATION: SEE FIGURE 2

#### **RECORD OF BOREHOLE:** 14-1

DATUM: Geodetic BORING DATE: November 19, 2014

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

SHEET 1 OF 1

<u>ا</u> ا	l	로	SOIL PROFILE	1.		ЭА	MPLI		DYNAMIC PENETRA RESISTANCE, BLOV	/S/0.3m	Κ.	k,	cm/s		′, [	널	PIEZOMETER
DEPTH SCALE METRES		BORING METHOD		STRATA PLOT	ELEV.	ER	ш	BLOWS/0.3m	20 40	60	80	10 <sup>-6</sup>	10 <sup>-5</sup>	10-4	10-3	ADDITIONAL LAB. TESTING	OR STANDPIPE
Д Т Е Щ		RING	DESCRIPTION	\$ATA	DEPTH	NUMBER	TYPE	/SMC	SHEAR STRENGTH Cu, kPa	nat V. rem V.	+ Q - ● ⊕ U - ○		R CONTE		CENT → WI	ADDI AB. T	INSTALLATION
נ	L	8		STR	(m)	Z		BL	20 40	60	80	10	20	30	40		
0		$\Box$	GROUND SURFACE		178.59												
ŭ			ASPHALT (100 mm) FILL - (SM) SILTY SAND, some clay,		0.00 0.10												Sand S
			FILL - (SM) SILTY SAND, some clay, trace gravel; grey, trace organics, moist, loose			1	SS	9									XIII
					177.90												
			(SP) SAND with clay, trace gravel, trace silt; brown with red iron mottling;		0.69												Bentonite
1			non-cohesive, moist, compact			2	SS	11									
		ngers			177.14												∑ A Sand Nov. 19, 2014 ∴
	Mount	tem A	(SW) SAND, some silt; brown; wet,		1.45												Sand   NOV. 19, 2014
	ruck	203 mm O.D. Hollow Stem Augers	loose to compact			3	SS	7									
2	E 85 1	요. 원				Ŭ											
	S	O mm															[3] 
		203															
						4	SS	14									Screen
3			(OM) OMNER ""	\(\frac{1}{2}\)	175.62												
3			(SW) SAND, some silt, some gravel; brown; wet, compact		2.97												
						5	SS	12									
		Ц	END OF BODELIOLE		174.93 3.66												1. Water level in
			END OF BOREHOLE		3.00												piezometer measure at a depth of 1.30 m
4																	below ground surface (Elev. 177.29 m) on
																	November 19, 2014.
5																	
6																	
7																	
(																	
8																	
9																	
10																	
	_																
DE	רין	ı H S	CALE							C-13	er iates					L	OGGED: DG

## **RECORD OF BOREHOLE: 14-2**

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: SEE FIGURE 2

BORING DATE: November 18, 2014

HAMMER TYPE: AUTOMATIC

.	Q Q	SOIL PROFILE			SA	MPLE	S	/NAMIC PENETRATION ESISTANCE, BLOWS/0.3m	,	k, cm/s	ONDUCTIVITY,	و ِ [ ]	DIEZOMETER
METRES	BORING METHOD		STRATA PLOT	]	œ		- 1	20 40 60 80	٨	10 <sup>-6</sup> 1	0 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	PIEZOMETER OR
MET	NG	DESCRIPTION	TA P	ELEV.	NUMBER	TYPE	BLOWS/0.3m	HEAR STRENGTH nat V. + C ı, kPa rem V. ⊕ U	ર - ●		ONTENT PERCENT	3. E	STANDPIPE INSTALLATION
-	OR		IRA.	DEPTH (m)	$\exists$	-	<u></u>	ı, kra lelli v. 🕁 (	- 0		<del>──</del> WI	\frac{1}{2}	
			Ŋ	\ <i>'</i>		$\dashv$	<u> </u>	20 40 60 80		10 2	20 30 40		
0	_	GROUND SURFACE	PA	178.74			4						LSI
		CONCRETE (100 mm) FILL - (SW) Gravelly SAND, angular.		0.00 0.10									Sand
		FILL - (SW) Gravelly SAND, angular, well graded; brown; non-cohesive	$\otimes$		1	ss	5				<b>b</b>		
			$\bowtie$										
			$\otimes$										
			$\otimes$										
1					2	SS	14			0			abla
			$\otimes$										Nov. 18, 2014
		(ML) SILT, some clay; brown; cohesive,		177.29 1.45									
		wet, firm											
					3	SS	7				0		Bentonite
2													Demonite
				176.45									
		(SM) SILTY SAND, trace gravel; brown; non-cohesive, wet, loose to compact		2.29									
	ŧ	final conesive, wet, loose to compact		.	4	ss	11						
	₩.												
3	Truc			1									
ا	CME 85 Truck Mount	5  		]									
	8				5	ss	8			C	}		
	5												8
		`		]									Sand
				]									
4					6	ss	4						
				]									
				1									
			411		7	ss	20			С			Screen
5				]									
				] [	8A					0			<del> </del>
				173.04	٠, ١	ss	32						
		(ML) Sandy SILT, some gravel; grey (TILL); non-cohesive, dense, wet		5.70 172.80	8B	_ [				ф			
6		END OF BOREHOLE	1	5.94									Water level in piezometer measure
													at a depth of 1.20 m
													below ground surfac (Elev. 177.54 m) on
													November 18, 2014.
7													
8													
٦													
9													
10													
		1										- 1	1
DE	PTH	SCALE						Golder Associat	,			L	OGGED: DG
								Tabler & Table					IECKED: SDK

#### 14-3 **RECORD OF BOREHOLE:**

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: SEE FIGURE 2 BORING DATE: November 18, 2014

HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

щ	9		SOIL PROFILE			SA	MPL	ES	DYNAMIC PENETR RESISTANCE, BLO	ATION WS/0.3m	)	HYDRAULIC C k, cm/s	ONDUCTIVIT	TY,	-	PIEZOMETER
DEPTH SCALE METRES	Į	BORING METHOD		STRATA PLOT		œ		BLOWS/0.3m	20 40	60	80 `	10 <sup>-6</sup> 1	0-5 10-4	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR
	2	<u>5</u>	DESCRIPTION	A	ELEV.	IBE	TYPE	S/0.	SHEAR STRENGTH Cu, kPa	l nat V	- Q- ●	WATER C	ONTENT PE	RCENT	1 <u> </u>	STANDPIPE INSTALLATION
	į		5200. W. 11011	RAT	DEPTH	NUMBER	7	§.	Cu, kPa	rem V. 6	Ð U- O	Wp I	W	— <b>I</b> WI	AB AB	INSTALLATION
_	à	ĭ		STI	(m)	_		В	20 40	60	80		20 30	40	-	
			GROUND SURFACE		178.67											
0		$\sqcap$	CONCRETE (100 mm)	p A											1	Sand
			Hydro-vacuumed and unsampled		0.10											Sanu (2)
1	nnt	n Augers														Bentonite $\sqrt{2}$ Nov. 18, 2014
2	CME 85 Truck Mor	203 mm O.D. Hollow Stem Augers	(ML) Sandy SILT, trace gravel; brown; non-cohesive, loose, wet		176.38 2.29	1	SS	7								Sand
3			(SW) SAND, some gravel, brown; non-cohesive, wet, compact		175.01 3.66	2	SS	5								Screen
- 4			END OF BOREHOLE		174.25 4.42	3	SS	16								1. Water level in
5																piezometer measure at a depth of 1.20 m below ground surface (Elev. 177.47 m) on November 18, 2014.
6																
7																
- 8																
9																
10																
DEI			CALE							Gold Associ	er					OGGED: DG IECKED: SDK

LOCATION: SEE FIGURE 2

#### **RECORD OF BOREHOLE:** 14-4

SHEET 1 OF 1 DATUM: Geodetic

BORING DATE: November 19, 2014

HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

A V	9	НОР	SOIL PROFILE	1_	1	SA	MPL		DYNAMIC PE RESISTANCE	NETRAT , BLOW	TION S/0.3m	1		k, cm/s	ONDUCT	ΓΙVΙΤΥ,	T	. AR	PIEZOMETER
DEPTH SCALE METRES		BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	20 SHEAR STRE Cu, kPa	40 NGTH		80 - Q - • - U - O	W	1	O <sup>-5</sup> 1 ONTENT	PERCE		ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
-	2	ň	0001110 01105105	STI	(m)	Ē		BI	20	40	60	80		-			40	<u> </u>	
0	_	$\dashv$	GROUND SURFACE FILL - SAND and GRAVEL; grey;		181.30	1Δ	SS						0					1	
	ĺ		\non-cohesive, dry	/1111	0.00	, A	00						ັ						
			(ML) CLAYEY SILT; brown; cohesive,			1B	SS	11						0					
			w <pl, stiff<="" td=""><td></td><td>180.69</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>		180.69														
			(ML) CLAYEY SILT, some sand, some gravel; brown, (TILL-LIKE); cohesive, w~PL, firm		0.61														
1			w~PL, firm																
·						2	SS	6						0					
				111	179.90														
			(ML) CLAYEY SILT, some sand, some gravel; brown (TILL); cohesive, w~PL,		1.40	_													
			stiff to very stiff																
						3	SS	11						1					
2						_													
		ε			1														
	ļ,	Stem Augers				4	SS	24						0					
	Mou	Stem				*	33	24											
3	Truck	Hollow §																	
3	CME 85 Truck Mount	님																	
	S	O.			1	5	SS	25											
		203 mm O.D.																	
		"	(ML) SILT, some sand; brown;	7/1	177.57 3.73														
4			non-cohesive, wet, dense		00														
4					177.03	6A	SS							(	1				
			(SW) SAND, well graded, some silt;	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4.27	6B	SS	45						0					
			brown with orange mottling, stratified; \non-cohesive, wet, dense	ЛШ	4.42														
			(ML) SILT, some sand; brown, zones of																
5			silty fine sand; non-cohesive, wet, dense			7	SS	30							0				
						8	SS	22							0				
					475.00	-									ľ				
6		Н	END OF BOREHOLE		175.36 5.94														
7																			
8																			
^																			
9																			
10																			
-																			
				-1		•					-	1		1		1	1		
DE	PT	ΉS	CALE								Golde ssoci	er							OGGED: DG
1:	50								V	<b>y</b> A	ssoci	ates						CH	ECKED: SDK

## **RECORD OF BOREHOLE: 14-5**

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: SEE FIGURE 2

BORING DATE: November 19, 2014

HAMMER TYPE: AUTOMATIC

, F	2		SOIL PROFILE	<b> -</b>		SAN	/IPLE		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		k, cm/s		NG NG	PIEZOMETER
METRES	BODING METHOD	SING ME	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● Cu, kPa rem V. ⊕ U - ○	W	/ATER C	0 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> ONTENT PERCENT	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
7	9	200		STRA	(m)	3		BLO	20 40 60 80	l vv		→ W WI 20 30 40	₹5	
0		$\prod$	GROUND SURFACE	171.1	183.50		1	$\downarrow$						
			(SM) SILTY SAND, trace clay, trace organics; dark brown; non-cohesive, dry, loose			1	ss	6			0			
1		-	(ML) Sandy SILT, trace clay; brown; non-cohesive, wet, compact		182.81 0.69 -	2	ss	11			0			
		-	(CI) SILTY CLAY; brown to grey; cohesive, w~PL, stiff to firm		181.98 1.52	3A	ss	11			0			
2		S			_	3B					0			
3	CME 85 Truck Mount	102 mm Solid Stem Augers			 	4	ss	6						
	CME 8	102 mm S			179.77 -	5	SS	8			0			
4			(ML) CLAYEY SILT, some gravel trace sand; grey (TILL); cohesive, w <pl, stiff="" stiff<="" td="" to="" very=""><td></td><td>3.73</td><td>6</td><td>ss</td><td>11</td><td></td><td>0</td><td></td><td></td><td></td><td></td></pl,>		3.73	6	ss	11		0				
						7	ss	20						
5		-	(CI) SILTY CLAY, trace to some gravel.		178.17 5.33	_	55	26			0			
6			(CI) SILTY CLAY, trace to some gravel, trace sand; grey (TILL); w <pl, borehole<="" end="" of="" stiff="" td="" very=""><td></td><td>177.56 5.94</td><td>8</td><td>ss</td><td>26</td><td></td><td>C</td><td></td><td></td><td></td><td></td></pl,>		177.56 5.94	8	ss	26		C				
7			END OF BOILEROLL											
,														
8														
9														
10														
DE	PTI	H S	CALE	1				1	Golder	1	ı		LO	GGED: DG

#### **RECORD OF BOREHOLE:** 14-6

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: November 19, 2014

DATUM: Geodetic HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

Y P H	9		SOIL PROFILE	1_		SA	MPL	_	DYNAMIC PENETRA RESISTANCE, BLOV	110N /S/0.3m	,		k, cm/		Ţ	AL	PIEZOMETER
METRES	֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	BORING METHOD		STRATA PLOT	ELEV.	3ER	Ж	BLOWS/0.3m	20 40 SHEAR STRENGTH	60 8			1	10 <sup>-5</sup> 10 CONTENT	 0 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
_ . Я			DESCRIPTION	RATA	DEPTH	NUMBER	TYPE	-OWS	SHEAR STRENGTH Cu, kPa	rem V. ⊕	Ŭ- O			ONTENT		ADD LAB.	INSTALLATION
	`	m	CROUND SUBFACE	ST	(m)	Ė		B	20 40	60 8	0				40	$\vdash$	
0	-	$\dashv$	GROUND SURFACE (SM) SILTY SAND, trace to some	111	192.10									+		$\vdash$	
			gravel; mottled brown and orange; non-cohesive, loose			1	SS	4						)			
			(CL) SILTY CLAY: light brown to grev:		191.34 0.76												
1			(CL) SILTY CLAY; light brown to grey; cohesive, w>PL, soft to stiff			2	SS	4									
						3	SS	8									
2						ľ											
			(ML) CLAYEY SILT, some gravel; grey,		189.89 2.21												
	ŧ	gers	with layers of silty clay (TILL-LIKE); cohesive, w <pl, stiff<="" td=""><td></td><td></td><td>4</td><td>SS</td><td>8</td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td></pl,>			4	SS	8					0				
	k Mou	em Auç				4	33	6									
3	5 Truc	olid Ste	(MIL) OILT to-		189.05												
	CME 8	102 mm Solid Stem Augers	(ML) SILT, trace sand, trace gravel; grey; non-cohesive, wet, compact		3.05	5A	SS	14					0				
		102				5B	33	-									
			(CD) CAND '	Щ	188.29												
4			(SP) SAND, angular to sub-angular, poorly graded, trace gravel; grey; non-cohesive, dense, moist		3.81	_		0.5									
			non-conesive, dense, moist			6	SS	25				0					
			(SW) Gravelly SAND, trace silt; grey;		187.60 4.50												
			non-cohesive, compact	• •		_		4-				_					
5				• •		7	SS	17				0					
			(MIL) OLANGIVOUT		186.77												
			(ML) CLAYEY SILT; grey, stratified; cohesive, w <pl, hard<="" td=""><td></td><td>5.33</td><td></td><td>-</td><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>		5.33		-	20									
					186.16	8	SS	36					Ų				
6		Н	END OF BOREHOLE	Ни	5.94												
7																	
8																	
9																	
10																	
									<u> </u>					1			
DE	PT	ΉS	CALE							Golda	1					LC	OGGED: DG
1:	50									Golde ssocia	ites					СН	ECKED: SDK

1:50

#### RECORD OF BOREHOLE: 14-7

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: SEE FIGURE 2 BORING DATE: November 20, 2014

HAMMER TYPE: AUTOMATIC

CHECKED: SDK

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SAMPLES SOIL PROFILE BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT 10<sup>-5</sup> OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -<del>0</del>W Wp ⊢ (m) GROUND SURFACE 189.60 FILL - (ML) CLAYEY SILT, some 0.00 organics, trace gravel; brown; cohesive, w<PL, firm 1 SS 8 0 188.84 FILL - (CL) SILTY CLAY; grey-brown; cohesive, w~PL, stiff 0.76 2 ss 9 FILL - (ML) CLAYEY SILT, some sand, trace gravel; brown; cohesive, w<PL, 1.52 3 SS 12 0 Boomer Track Mount 2 187.39 2.21 FILL - (SM) SILTY SAND, trace gravel; mottled brown; non-cohesive, moist, SS 0 9 102 FILL - (ML) CLAYEY SILT, trace gravel; brown; cohesive, w<PL, firm 3.05 5 SS 7 0 185.79 FILL - (CL) SILTY CLAY; grey-brown; cohesive, w~PL, stiff 3.81 SS 11 0 185.03 4.57 END OF BOREHOLE ON CONCRETE PIPE GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9 10 DEPTH SCALE LOGGED: DG Golder

#### **RECORD OF BOREHOLE:** 14-8

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: November 20, 2014 DATUM: Geodetic

HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HYDRAULIC CONDUCTIVITY, k, cm/s DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp F (m) GROUND SURFACE 196.19 (CL) SILTY CLAY, trace sand, trace gravel; mottled grey-brown, organic inclusions in upper 0.3 m, layers of sandy silt below a depth of 1.0 m; cohesive, w~PL, firm to stiff SS 0 2 SS 13 0 Rentonite (SM) SILTY SAND, trace clay, trace gravel; brown to grey (TILL); non-cohesive, moist, compact SS 13 0 Boomer Track Mount 16 SS 4B Sand 193.22 (SW) SAND; grey; non-cohesive, moist, 2.97 0 SS (ML) SILT, some clay, trace sand, trace gravel; grey (TILL); cohesive, moist, very stiff dense 3.12 102 mm § 27 5B Jan. 5, 2015 192.53 (SW) SAND; brown; non-cohesive, wet, compact SS 19 0 Screen SS 23 0 190.93 (SM) SILTY SAND; brown; non-cohesive, compact, wet SS 13 8 190.25 1. Water level in END OF BOREHOLE piezometer measured at a depth of 3.32 m below ground surface (Elev. 192.87 m) on January 5, 2015. 9 10 DEPTH SCALE

Golder

1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17

GTA-BHS 001

#### **RECORD OF BOREHOLE:** 14-9

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 10, 2014

HAMMER TYPE: AUTOMATIC

DATUM: Geodetic

SP	I/DCP	I HAMMER: MASS, 64kg; DROP, 760mm	

BESCRIPTION  COROLAD SUPPACE  COROLAD SU	일   달	-	SOIL PROFILE			SA	AMPL	_	DYNAMIC PENE RESISTANCE, B	LOWS	6/0.3m	1	HYDR	k, cm/s	ONDUCT	IIVIIY,	Ţ	-   _   _ 	PIEZOMETER
Comparing the comparing to the compari	RES MET			٦٠٠١		l E		.3m						1	1	1		- NOIN STI	OR
Comparing the comparing to the compari	RG   RET	1	DESCRIPTION	TAF		- I #	YE	NS/0	SHEAR STRENG	HTE	nat V. +	Q - •	1				NT	DOT B. TE	INSTALLATION
Comparing the comparing to the compari	.   S	1		TRA		' ≥	-	lo S										\( \frac{1}{2} \)	
Fill_Tropell (150 mm)   Fill_Cask (150 mm)   Fill		-	ODOLIND CUREACE	ι,		+	-	ш	20 40		60 8	0	1	10	20 3	30 4	40	+	
Filt - (SNI) SLT FAMD, trace size, traces   0.11   10   10   10   10   10   10	0	- 1		   	181.70		-											+	
Section   Sect				₩			SS												
TOPSOIL    10   10   10   10   10   10   10   1		1	to some gravel; trace organics; brown to	$\bowtie$		1B		23						<b>→</b>					
TOPSOIL  TOP		1	grey, moist, compact	$\bowtie$															
TOPSOIL  TOP		1		$\bowtie$		-							l ,						
Majoration   Maj	1	╁	TOPSOIL		180.73	, ,	ss	9					'	ľ					
(ML) CLAYEY SILT and SAND, some graved (TILL); we'PL, very stiff or lead of graved (TILL); we'PL, very stiff or lead of sand of graved (TILL); we'PL, very stiff or lead of sand of sa		1	TOFSOIL		0.5											0			
2		-	(MIL) CLAVEV CILT	EEE															
2		1	gravel; brown, zones of fine sand and	112	1.3	$\vdash$	-												
2 8 8 177 50 177		1	gravel (TILL); w <pl, stiff<="" td="" very=""><td></td><td></td><td></td><td>00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>				00												
Multiplication   1985		1				3	55	26											
S   SS   34   O	-	ers				$\vdash$	-												
S   SS   34   O		a, L	(41) 21 4) (51)				+												
S   SS   34   O	Mole	Ster	(ML) CLAYEY SILT and SAND, some gravel, some silt, brown to grev (TILL):		2.36	1							,	1				<b> </b> ,	
S   SS   34   O	Miri S	Solid	cohesive, moist, very stiff to hard		1	4	55	29					'	1				IMM	
S   SS   34   O		E			1	$\vdash$	-												
C(I) SILTY CLAY, trace sand, trace gravel; grey, zones of sit; cohesive, w-PL, very setti 177.59  END OF BOREHOLE 5.16  The control of the ground surface (6 177.70 m) on December 10, 20  The control of the ground surface (6 177.70 m) on December 10, 20	3   E	105			1	$\vdash$	1												
C(I) SILTY CLAY, trace sand, trace gravel; grey, zones of sit; cohesive, w-PL, very setti 177.59  END OF BOREHOLE 5.16  The control of the ground surface (6 177.70 m) on December 10, 20  The control of the ground surface (6 177.70 m) on December 10, 20				H	1	5	SS	34					0						
177.59   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.70   1					1	١	-												
177.59   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.50   177.70   1							1												Dec. 10, 2014
(C) SLTY CLAY, trace sand, trace gravet; grey, zones of silt, cohesive, we'r'. very silf!  END OF BOREHOLE  176.52  END OF BOREHOLE  7  8  8																			
gravel; grey, zones of silt; cohesive, w-PL, very stiff  END OF BOREHOLE  5 18  178.52  END OF BOREHOLE  5 18  179.52  6 SS 28  28  179.52  6 SS 28  179.52  6 SS 28  179.52  6 SS 28  179.52  6 SS 28  199.53  100  11. Water level in borehole measure depth of 3.7 m be grey dep	4	-	(CI) SILTY CLAY trace sand trace																
6 SS 28  END OF BOREHOLE  178.52  1. Water level in borehole measure depth of 3.7 m be ground surface (6 177.70 m) on December 10, 20  7  8  8		- 1	gravel; grey, zones of silt; cohesive,		1														
5   176.52   1. Water level in torchole measure depth of 3.7 m be ground surface (6 177.70 m) on December 10, 20		1	w <pl, stiff<="" td="" very=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>																
5   176.52   1. Water level in torchole measure depth of 3.7 m be ground surface (6 177.70 m) on December 10, 20		1																	
END OF BOREHOLE  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on December 10, 20  1. Water level in thorehole measure depth of 3.7 m be ground surface (f 177.70 m) on Decemb	_	1				6	SS	28										МН	
8 8 9 9	ا ا																		<b></b>
8 8 9 9		1	END OF BOREHOLE		5.18	3													borehole measured
7 8 8		1																	around surface (Ele
6		1																	177.70 m) on
7 8 9	6	1																	December 10, 2014
		1																	
		1																	
		1																	
		1																	
	7																		
	'																		
	8																		
	-																		
	9																		
10	10																		
										_	L		L		L	L		1	
					•						•		•		•				
DEPTH SCALE  1:50  LOGGED: DG  CHECKED: SDK	DEPTH 1:50	I SC	CALE								Golde	r							

## **RECORD OF BOREHOLE: 14-10**

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: SEE FIGURE 2

BORING DATE: December 10, 2014

HAMMER TYPE: AUTOMATIC

DESCRIPTION  ND SURFACE  OIL (130 mm)  LTY CLAY; brown, stratified; ive, moist, stiff	STRATA PLOT	ELEV. DEPTH (m)	=	TYPE	BLOWS/0.3m	SHEAR Cu, kPa	STREN	IGTH r	nat V. +	30 `` Q - ●	10 W.		0 <sup>-5</sup> 1 L ONTENT	1	10 <sup>-3</sup> ⊥	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE
ND SURFACE OIL (130 mm)	STRATA P	DEPTH (m)	NUMBE	TYPE	OWS/0	SHEAR Cu, kPa	STREN	IGTH r	nat V. +	Q - •	W	ATER C	ONTENT	PERCE	ENT	ΙĘË	
OIL (130 mm)	STRA	(m) 188.60	\frac{1}{2}	[ ]	ΙŶ	l, u		r	em V. 🕀	Ü- Ö			147			] H	INSTALLATION
OIL (130 mm)			+		面	20					Wp 1				WI 40	₹ <u>\$</u>	
OIL (130 mm)			۰Ι	Н	H	20	, 4	10 6	.υ <u>ε</u>	30	1			1			
LTY CLAY; brown, stratified; ive, moist, stiff			0 1A	H	$\vdash$												
		0.13	3 1B	SS													
			"	33	''												
			2	SS	11									1			
		187.15	5														
SILTY SAND, some gravel, trace	, ,	1.45	5	-													
SILTY SAND, some gravel, trace rown, containing fissures with on, containing cobbles and	- A   N		3	SS	12							0				мн	
ers (TILL); non-cohesive, moist to ompact to very dense			ľ									Ŭ				"""	
		<u>.</u>	$\vdash$	1													
	4																
	4		4	ss	73						C	)					
		<u> </u>															
			$\vdash$														
			5	SS	76						0						
	4 A	Ţ	١		"												
				1													
SILTY SAND, trace clay, trace	4,4	184.49															
; brown; non-cohesive, moist, act																	
			$\vdash$	-													<u></u>
			6	SS	29												200. 10, 2011
		183.42															
OF BOREHOLE	1111	5.18															Water level in operation     Water level in operations
																	depth of 4.6 m below
																	ground surface (Ele 184.61 m) on
																	December 10, 2014
		1															
		1															
		1															
		1															
		1												1			
		1	1														

LOCATION: SEE FIGURE 2

#### **RECORD OF BOREHOLE:** 14-11

SHEET 1 OF 1 DATUM: Geodetic BORING DATE: December 10, 2014

HAMMER TYPE: AUTOMATIC

,	ב	<u> </u>	SOIL PROFILE			SA	MPL	ES	DYNAMIC PENETRA RESISTANCE, BLOW	11ON /S/0.3m	)	HYDRAULIC C k, cm/s	ONDUCT S	HVITY,	Tlagl	PIEZOMETER
METRES	COLTAM SINIO A	=		LOT		<u>~</u>		.3m	20 40	60	80	1 1	0 <sup>-5</sup> 1	0-4 10-3	ADDITIONAL LAB. TESTING	OR
Ę	2	5	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat V.	+ Q- •	WATER C		PERCENT	E#.	STANDPIPE INSTALLATION
7	Ğ	2		TRA	DEPTH (m)	Ž	-	3200				vvp —	→W		FE AF	
		-	CDOLIND SUBFACE	ò			$\vdash$	ш	20 40	60	80	10	20 3	30 40	-	
0		$\dashv$	GROUND SURFACE TOPSOIL	EEE	182.20		$\vdash$								$\dashv$	
		╽┟	(SM) SILTY SAND, trace gravel; brown,		0.00 182.00 0.20	1A	-									
			organic staining; non-cohesive, dry,			1B	ss	13				0				
			compact		1	_	.									
		╽┠	(CI) SILTY CLAY, trace sand, trace to		181.44 0.76	$\vdash$	-									
1			(CI) SILTY CLAY, trace sand, trace to some gravel; brown to grey, some layering; cohesive, w <pl, stiff="" td="" to="" very<=""><td></td><td>1</td><td>2</td><td>SS</td><td>47</td><td></td><td></td><td></td><td>l I ,</td><td>ļ.,</td><td></td><td></td><td></td></pl,>		1	2	SS	47				l I ,	ļ.,			
			stiff		1		33	17								
					1	_	-									
					1		-									
					1	3	ss	21					0			
2			0.08 m sand seam at a depth of 1.83 m			ľ	55	-								
		gers		KK.	1	$\vdash$	-									
	Ф	m Au			1		1									
	i Moi	d Ste			1	4	SS	22								
	Ē	Soli			1											
3		102 mm Solid Stem Augers			1	$\vdash$										
-		=			1											
					1	5	ss	22					0			
					1											
					1		1									
4					470.00											
			(SM) gravelly SILTY SAND, some clay;		178.09 4.11											
			grey; non-cohesive, wet, compact		]											
						<u> </u>										
				Ш	1											
5				11		6	SS	16				0			MH	
ŀ		Ц	END OF BOREHOLE		177.02 5.18											
			L. D. DONLINGLE													
6																
7																
8																
9																
10																
_		_		L		L		_								
	_															
DEI	PTI	H S	CALE							Gold	er					OGGED: AVR
1:5	50									ssoci	iates				CHE	ECKED: SDK

1:50

LOCATION: SEE FIGURE 2

#### **RECORD OF BOREHOLE:** 14-12

SHEET 1 OF 1 DATUM: Geodetic BORING DATE: December 16, 2014

HAMMER TYPE: AUTOMATIC

CHECKED: SDK

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT 10<sup>-5</sup> OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp F (m) GROUND SURFACE 179.48 OP OC Nitrate Phospate TOPSOIL 1A Cement (CI) SILTY CLAY; brown to grey, stratified; cohesive, w>PL, firm to soft Sand 1B SS 0 Bentonite 2 SS 8 lo M&I <u>∑</u> Jan. 5, 2015 3 SS 4 2 Mini Mole 102 mm Solid Stem SS 0 3 (CI) SILTY CLAY, trace sand, trace gravel; (TILL-LIKE); cohesive, w>PL, soft 176.51 Screen 5 SS 0 4 175.37 4.11 (SW) SAND, some silt; grey; non-cohesive, wet, loose N/ R SS 6 174.30 END OF BOREHOLE Water level in piezometer measured 5.18 at a depth of 1.49 m \*N/R - Not Recorded below ground surface (Elev. 177.99 m) on January 5, 2015. GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9 10 DEPTH SCALE LOGGED: AVR Golder

LOCATION: SEE FIGURE 2

#### **RECORD OF BOREHOLE:** 14-13

SHEET 1 OF 1 DATUM: Geodetic BORING DATE: December 16, 2014

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

, ALE	HOD	SOIL PROFILE	1 <b>-</b>		SA	MPLE		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	1	HYDRAULIC CONDUCTIVITY, k, cm/s	₽ B B B	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 60 SHEAR STRENGTH nat V. Cu, kPa rem V	80 + Q - ● . ⊕ U - ○	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> WATER CONTENT PERCENT  Wp   W   WI	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	Ď	GROUND SURFACE	ST			$\dashv$	ΔĒ	20 40 60	80	10 20 30 40	$\vdash$	
0		TOPSOIL		180.90 8:88	1A	SS					+	
. 1		(CI) SILTY CLAY; mottled grey-brown; cohesive, w~PL, soft to firm			1B		3					
'		(ML) CLAYEY SILT, some sand, some gravel; grey; cohesive, w <pl, stiff<="" td=""><td></td><td>179.45 1.45</td><td>2</td><td>SS</td><td>8</td><td></td><td></td><td>0</td><td></td><td></td></pl,>		179.45 1.45	2	SS	8			0		
2		gravel; grey; cohesive, w <pl, stiff<="" td=""><td></td><td></td><td>3</td><td>ss</td><td>18</td><td></td><td></td><td></td><td></td><td></td></pl,>			3	ss	18					
3		(MI ) Sandy SII T some clay: grey:		177.93 2.97	4	SS	11			0		
		(ML) Sandy SILT, some clay; grey; non-cohesive, moist, dense			5	ss	46					
4												
5					6	SS	38					
6	•	END OF BOREHOLE	3.758	5.18								
7												
8												
9												
DE	PTH S	CALE						Gol	don		LO	GGED: EWB

#### 14-14 **RECORD OF BOREHOLE:**

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: SEE FIGURE 2 BORING DATE: December 9, 2014

HAMMER TYPE: AUTOMATIC SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp -(m) GROUND SURFACE 176.30 FILL - TOPSOIL (150 mm) 0.00 FILL - (SM) SILTY SAND, some gravel, 0.15 SS 22 trace clay; mottled brown and grey; non-cohesive, moist, compact 1B 0 175.44 0.86 0 2A TOPSOIL 2B 0 SS 12 (SW) SAND, some gravel; brown; 1.02 2C 0 non-cohesive, wet, compact 174.42 SS 28 (SM) SILTY SAND, some gravel, trace to some clay; brown to grey (TILL); 1.88 3B 2 moist, compact to dense Mini Mole SS 20 102 mm 5 SS 0 40 172.19 4.11 (ML) SILT, some sand, trace clay; grey; non-cohesive, w>PL, very stiff SS 21 0 МН 171.12 END OF BOREHOLE 5.18 GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9

DEPTH SCALE 1:50

10

Golder

LOGGED: AVR

#### RECORD OF BOREHOLE: 14-15

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 DATUM: Geodetic BORING DATE: December 9, 2014 HAMMER TYPE: AUTOMATIC SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp F (m) GROUND SURFACE 179.83 TOPSOIL 0.00 (SP) SAND, some gravel; brown; non-cohesive, dry, loose 0.15 1B SS 0.27 1C (CI) SILTY CLAY, some sand, some gravel; mottled brown-grey, stratified; cohesive, w>PL, firm to very stiff 2 SS 13 0 0 SS 34 (SM) SILTY SAND, some gravel; brown to grey (TILL); non-cohesive, moist, compact to dense 2 1.98 3B 0 SS 17 Mini Mole 5 SS 31 0 102 Jan. 5, 2015 Screen SS 6 32 174.19 5.64 (SM) SILTY SAND; grey; non-cohesive, compact SS 20 МН 173.12 6.71 Water level in piezometer measured END OF BOREHOLE at a depth of 3.92 m below ground surface (Elev. 175.91 m) on January 5, 2015. GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9

DEPTH SCALE 1:50

10

Golder

LOGGED: AVR

1:50

#### RECORD OF BOREHOLE: 14-16

SHEET 1 OF 1

CHECKED: SDK

LOCATION: SEE FIGURE 2 BORING DATE: December 9, 2014

DATUM: Geodetic HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -<u>₩</u> Wp ⊢ (m) GROUND SURFACE 181.30 TOPSOIL 0.00 (SP) SAND, trace gravel; brown; 0.15 SS 11 non-cohesive, dry, compact 1B 0 180.61 (CI) SILTY CLAY; brown, varved, containing sand seams at a depth of 1.07 m; cohesive, w>PL, stiff 2 SS 12 0 179.85 (CL) SILTY CLAY, trace sand, trace gravel; brown, stratified; cohesive, w~PL, very stiff SS 24 2 Mini Mole 102 mm Solid SS 0 23 178.33 (SM) SILTY SAND, some gravel; grey (TILL); non-cohesive, moist, compact SS 17 5 0 (ML) CLAYEY SILT, some sand, some gravel; grey (TILL); cohesive, w<PL, hard ss 50/ 0.10 176.63 END OF BOREHOLE GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9 10 DEPTH SCALE LOGGED: AVR Golder

# **RECORD OF BOREHOLE:**

14-17 SHEET 1 OF 1 DATUM: Geodetic

LOCATION: SEE FIGURE 2 BORING DATE: December 15, 2014

HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DESCRIPTION  ND SURFACE  (ML) CLAYEY SILT, trace sand gravel, some organics; dark brove, firm to very stiff  LTY CLAY; mottled brown-green we, w>PL, very stiff  Sandy SILT, some clay, some continuous mottled grey-brown (TILL); shesive, moist, very dense	own; ₽₽y;	194.4 194.4 194.4 194.4	WINN 1 2 3 3 4 4 66 77 5 5	SS	22	20 SHEAR Cu, kPa 20	STREN	IGTH I	ıat V. + em V. ⊕	Q - • 0 U - ○	W	ATER C	ONTENT	PERCE	0 <sup>-3</sup> L NT WI 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION  Sand  Bentonite  Jan. 5, 2015
(ML) CLAYEY SILT, trace sand gravel, some organics; dark brown, firm to very stiff  LTY CLAY; mottled brown-greeve, w>PL, very stiff  Gandy SILT, some clay, some; mottled grey-brown (TILL);	nd, own;	194.4 0.0 191.4 2.5	3 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	SS	6 12 22 22	2:		0 (	0 8	30	1		0 0	0 4	40		Bentonite
LTY CLAY; mottled brown-gregive, w>PL, very stiff  Sandy SILT, some clay, some ; mottled grey-brown (TILL);	29y;	190.3	3 4 4 5 5	SS	12 22 22							0	0				Bentonite
ive, w>PL, very stiff  Sandy SILT, some clay, some; mottled grey-brown (TILL);		190.3	3 4 4 56 57 5 5	SS	22							0	0				∑ Jan. 5, 2015
ive, w>PL, very stiff  Sandy SILT, some clay, some; mottled grey-brown (TILL);		190.3	4 607 5	SS	22							0					∑ Jan. 5, 2015
ive, w>PL, very stiff  Sandy SILT, some clay, some; mottled grey-brown (TILL);		190.3	5	-								0	0				, is
ive, w>PL, very stiff  Sandy SILT, some clay, some; mottled grey-brown (TILL);		190.3	5	SS	24								0				
; mottled grey-brown (TILL);	2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4																[ [s]
	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	t. 1	$\vdash$		i 1												
			6	ss	50							<b>)</b>					Screen
CLAYEY SILT, some sand, som ; grey (TILL); cohesive, w <pl, iiff</pl, 	me	188.7	<u>'9</u> i4	-													
DF BOREHOLE		187.7 6.7		ss	26						(						Water level in piezometer measure of a death of 2.50 m.
																	at a depth of 2.50 m below ground surfac (Elev. 191.93 m) on January 5, 2015.
																	Golder

#### RECORD OF BOREHOLE: 14-18

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 15, 2014

DATUM: Geodetic HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT 10<sup>-5</sup> OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -<u>₩</u> Wp F (m) GROUND SURFACE 192.30 TOPSOIL 0.00 1A FILL - (ML) CLAYEY SILT, some sand, trace gravel, trace organics; brown; cohesive, w~PL, stiff 1B SS 191.61 (SM) SILTY SAND, fine grained; brown, 0.69 stratified; non-cohesive, moist, compact 2 ss 14 190.85 (SM) SILTY SAND, some gravel, trace clay; brown, with oxidation staining (TILL); non-cohesive, moist, dense to SS 48 0 very dense SS 65 189.33 (ML) CLAYEY SILT, some gravel, trace sand; grey (TILL); cohesive, hard 2.97 83/ 0.25 5 SS 188.19 4.11 (ML) Sandy SILT; brown; non-cohesive, SS 45 0 187.12 END OF BOREHOLE 5.18 GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9 10

DEPTH SCALE

1:50

LOGGED: EWB Golder CHECKED: SDK

#### **RECORD OF BOREHOLE:** 14-19

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 15, 2014 DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

ا را	오	SOIL PROFILE	1.		ЭА	MPLE	_	DYNAMIC PENETR. RESISTANCE, BLO	NS/0.3m	ĸ.		k, cm/s	;	IVITY,		₽ <sub>B</sub>	PIEZOMETER
METRES	BORING METHOD		STRATA PLOT		监		BLOWS/0.3m	20 40	60	80 `		1	1	0 <sup>-4</sup> 10		ADDITIONAL LAB. TESTING	OR STANDPIPE
MET	NG	DESCRIPTION	TA F	ELEV. DEPTH	NUMBER	TYPE	NS/0	SHEAR STRENGTH Cu, kPa	nat V. +	Q - O	W			PERCEN		B. TE	INSTALLATION
4	BOR		TRA	(m)	₹	-	3LO				I **			V		44	
$\dashv$	_	GROUND SURFACE	S			$\vdash$	_	20 40	60	80	<del> </del>	10 :	20 3	0 40	J		
0	$\top$	TOPSOIL	EEE	188.80 0.00 0.10	1A	$\vdash$	-				-					OP OC	
				0.10		امما	٫									Nitrate Phospate	
		FILL - (ML) CLAYEY SILT, some sand, trace gravel, trace organics; brown to dark brown; cohesive, w>PL, firm	$\otimes$		1B	33	э						0				
			$\bowtie$	188.11													
		(CI) SILTY CLAY; brown, stratified; cohesive, w>PL, stiff		0.69													
1		Collesive, W/FL, Suii			2	SS	9									M&I	
					_		Ĭ									I WICH	
				187.35													
		(ML) CLAYEY SILT, some sand, some gravel; brown (TILL); cohesive, w <pl,< td=""><td></td><td>1.45</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,<>		1.45	-												
		stiff to very stiff		1	3A	SS	16										
2					3B							0					
				1													
			113	1													
				1	4	ss	14					0					
				1													
3		(SW) SAND, some silt, trace clay;	111	185.83													
		brown; wet, compact		2.51	_		83/										
				1	5	SS	83/ 0.25						ρ				
				:													
4																	
-		(SM) SILTY SAND, some gravel, trace	414	184.69 4.11													
		clay; brown (TILL); non-cohesive, very dense, wet	4 4 4 4														
		derise, wet		]													
			4 4	1													
5				1	6	SS	45					0					
Ĭ			4	183.62													
		END OF BOREHOLE		5.18													
6																	
7																	
.																	
8																	
۱																	
9																	
-																	
10																	
.0																	
				<u> </u>													
DEF	PTH S	CALE							Gold Associ							LO	GGED: EWB
									Gold	er							CKED: SDK

1:50

#### RECORD OF BOREHOLE: 14-20

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 15, 2014

DATUM: Geodetic HAMMER TYPE: AUTOMATIC

CHECKED: SDK

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -<u>₩</u> Wp ⊢ (m) GROUND SURFACE 184.60 TOPSOIL (150 mm) 0.00 1A SS 6 (CI) SILTY CLAY; mottled grey-brown, some layering; cohesive, w>PL, firm 0.15 1B 0 183.91 (SM) SILTY SAND, trace clay, trace gravel; brown (TILL-LIKE); non-cohesive, loose 2 ss 9 0 183.15 (SM) SILTY SAND, some gravel, trace clay; brown to grey (TILL); non-cohesive, dry to moist, very dense to dense SS 67 0 Geoprobe 7822 DT Track Mount 2 SS 0 46 181.63 (ML) SILT, trace to some clay; grey, 2.97 containing seams of silty clay; non-cohesive, wet, dense SS 5 32 0 180.49 4.11 (SW) SAND, fine grained, trace silt, trace gravel; grey, stratified; non-cohesive, wet, compact SS 16 179.42 Water level in open borehole measured at a END OF BOREHOLE 5.18 depth of 3.7 m below ground surface (Elev. 180.90 m) on December 15, 2014. GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9 10 DEPTH SCALE LOGGED: AVR

Golder

# **RECORD OF BOREHOLE: 14-21**

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: December 15, 2014

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

щ	9	9	SOIL PROFILE			SA	MPL	ES.	DYNAMIC PENET RESISTANCE, BI	TRATIC	0.3m	)	HYDRA	AULIC Co	ONDUCT	TIVITY,	T	٥٦	PIEZOMETER
DEPTH SCALE METRES		BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	20 40 SHEAR STRENG Cu, kPa	TH n		Q - •		O <sup>-6</sup> 10 ATER C	L ONTENT	PERCE	0 <sup>-3</sup> ⊥ :NT	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
7	0	BOR		STRAT	DEPTH (m)	N N	F	BLOW	Cu, kPa 20 40			0 - 0		0	<del>\</del> W		WI 40	AD	INO INEE CHOIC
. 0			GROUND SURFACE TOPSOIL (130 mm)	E E E	182.80	1A													
		,	(ML) CLAYEY SILT, trace gravel; mottled grey-brown, containing rootlets; cohesive, w>PL, firm to stiff		0.13		SS	4							0				
1			(O) OILTY OI AV and the leaves to serve		181.35 1.45		ss	9							0				
2	ount		(CI) SILTY CLAY; mottled brown to grey, some varves; cohesive, w <pl, stiff<="" td="" very=""><td></td><td></td><td>3</td><td>ss</td><td>17</td><td></td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td><td></td></pl,>			3	ss	17						0					
	22 DT Track Mo	83 mm Direct Push SVT	(ML) CLAYEY SILT, some gravel, trace sand; brown (TILL); cohesive, w>PL, stiff	LUCK	180.59 2.21 180.06	_	ss	14						0					
3	Geoprobe 78	83 mm Di	(ML) Sandy SILT, some gravel, trace clay; grey, with zones of clayey silt (TILL); non-cohesive, moist, compact	4 4 4 4 4 4	2.74														
				44 44 44		5	SS	16					0						
4				444444															
5			END OF PODELIGIE	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	177.62 5.18		SS	11						0					1. Open borehole dr
			END OF BOREHOLE		5.16														1. Open borehole dry upon completion of drilling on Dec. 15, 2014.
6																			
7																			
8																			
9																			
10																			
DE 1:			CALE	1	<u> </u>					G	olde socia	ŗ	<u> </u>						DGGED: AVR ECKED: SDK

## RECORD OF BOREHOLE: 14-22

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: SEE FIGURE 2

BORING DATE: December 15, 2014

	ŏ		SOIL PROFILE			SAMF	PLES	DYNAMI RESISTA	ANCE.	BLOWS	/0.3m		IIIDIG	k, cm/s	CONDUCT	IVIII,	_	ا ن	p.==c · ·
METRES	BORING METHOD	İ		TO.		~	π	20				30 ,	1			0-4	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	PIEZOMETER OR
1ETR	Š		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	BLOWS/0.3m	SHEAR	STREN	IGTH i	nat V. +	Q - •		ATER C	ONTENT	PERCI		TËË.	STANDPIPE INSTALLATIOI
2	ORIN			RAT	DEPTH (m)	\$   }	8	Cu, kPa		1	em V. ⊕	U- O					WI	ADI	INGTALLATIO
	ă	1		ST	(111)		B	20	4	0 6	30 08	30					40		
0		- 1	GROUND SURFACE		184.20														
Ů		- 1	TOPSOIL (200 mm)		0.00 184.00	1A													
		- 1	FILL - (CI) SILTY CLAY, some gravel, trace organics; brown to grey, containing		0.20	1B S	6												
			rootlets; cohesive, w>PL, firm to soft																
1						2 S	3 3												
		-	(ML) CLAYEY SILT, trace sand, trace		182.75 1.45														
			gravel; brown, with oxidation staining, fissured (TILL); cohesive, w>PL, stiff		1.40														
			fissured (TILL); cohesive, w>PL, stiff		1	3 S	3 11							0					
2	Jount	.			181.99														
	Track Mount	չբԻ	(ML) CLAYEY SILT; brown, layered;		2.21	4.								_					
	T TO	Fus Fus	cohesive, w>PL, stiff (SM) SILTY SAND, some gravel, trace		181.69 2.51	4A 4B SS	3 34							0					
	7822	<u>a</u>	clay; (TILL); wet, dense	9 4	2.68	4B S	34						(						
3	Geoprobe 7822 DT Track M	83 mn	(ML) Sandy SILT, some gravel, trace to some clay; brown to grey (TILL); non-cohesive, moist, dense to compact	4 4 4 4 4 4									`						
-	Geo	~	non-cohesive, moist, dense to compact																
				4		5 S	3 20						C	}					
				444															
				4															
4																			
_						6 S	3 27						0						
5			EUR OF BOREWS	4 4	179.02														1 One- bar 1 1
			END OF BOREHOLE		5.18														1. Open borehole of upon completion of drilling on Dec. 15,
																			drilling on Dec. 15, 2014.
6																			
7																			
8																			
9																			
10																			
				1											1				
DE										× –									DGGED: AVR

#### **RECORD OF BOREHOLE:** 14-23

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 8, 2014

DATUM: Geodetic HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

A C	0	BORING METHOD	SOIL PROFILE	1_		SA	MPLE		DYNAMIC PE RESISTANCE	NETRA , BLOW		1		k, cm/s			- AL NG	PIEZOMETER
METRES	!	Ш М		STRATA PLOT	ELEV.	H		BLOWS/0.3m	20	40		80		1	0-5 10-4	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
Ψ		S NC	DESCRIPTION	ΔTA	DEPTH	NUMBER	TYPE	WS/	SHEAR STRE Cu, kPa	NGTH	nat V. ⊣ rem V. €	- Q- ● 9 U- ○			ONTENT PERC		DDI T.B	INSTALLATION
5		ğ		STR	(m)	ž		BLC	20	40		80		′p	<del>)</del> W 20 30	- <b>I</b> WI 40	4 5	
	T	$\exists$	GROUND SURFACE	+	189.10				20	70	1				20 30	1		
0		П	TOPSOIL (200 mm)	EEE	0.00 188.90	1A									0			
			(CI) SILTY CLAY, trace sand, trace	M	0.20		ss	6										
			gravel; brown, varved; cohesive, w>PL, firm to stiff		1	1B												
						H												
					1													
1						2	ss	11							0			
					187.80													
			(ML) CLAYEY SILT, some sand, some gravel; grey, with zones of fine sand (TILL); cohesive, w <pl, stiff<="" td=""><td></td><td>1.30</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>		1.30													
			(TILL); cohesive, w <pl, stiff<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>															
						3	ss	14						þ				
2		ngers			1													
	ount	Stem Augers	(ML) CLAYEY SILT and SAND, some		186.89 2.21													
	sck	St.	sand, some gravel (TILL-LIKE); grey, with zones of fine sand; cohesive, w <pl,< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,<>															
	DŢr	Hollow 8	firm	13		4	SS	6						0			МН	
	B-45HD Track Mount	mm 0.D. ł																
3	8	E				$\vdash$												
		203				_												
						5	SS	8						0				
					1													
4					184.99													
			(SM) SILTY SAND, some gravel, trace clay; grey (TILL); non-cohesive, moist,		4.11													
			compact															
						6	ss	27					0				МН	
5					183.92													
			END OF BOREHOLE		5.18													Open borehole di upon completion of
																		drilling on Dec. 8, 2
•																		
6																		
7																		
7																		
8																		
Ů																		
9																		
10																		
	•			•	•						,		•	•			•	•
			CALE								Gold ssoci	er						OGGED: AVR
1:	50										ssoci	ates					CH	IECKED: SDK

## RECORD OF BOREHOLE: 14-24

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: SEE FIGURE 2

BORING DATE: December 8, 2014

!	2	⊋	SOIL PROFILE			SAM	PLES	DYNAN RESIS	ЛІС PEN TANCE,	IETRATI BLOWS	ON 5/0.3m	1	HYDR	AULIC C k, cm/s	ONDUC	TIVITY,	-	ای [	DIEZO: IETES
METRES	į	BORING MEI HOU		LOT		œ	3m	1				80 `	1			10-4	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	PIEZOMETER OR
METI		5	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	BLOWS/0.3m	SHEAF Cu, kPa	R STREM	NGTH	nat V. +	Q - • U - O				T PERCI	ENT	3. TE	STANDPIPE INSTALLATION
_		Š		TRA	DEPTH (m)	<b>∃</b>   f	-   8	Cu, KP						p <b></b>			WI	LÆE	
	Ľ	-	ODOLINID OLIDEAGE	.v			+"	2	0 4	40	60	80	1	0 :	20 T	30	40		
0		Н	GROUND SURFACE FILL - TOPSOIL		186.70											-			
			TIEE TOTOGIE																
						1 S	S 3									0			
				$\bowtie$	186.01														
			(CI) SILTY CLAY, trace sand, trace gravel; mottled brown-grey, block structure; cohesive, w~PL, firm to stiff		0.69														
1			structure; cohesive, w~PL, firm to stiff			2 S	s   7								5				
		, l				3 S	S 15								þ				
2		ugers			184.49														
	Mount	tem A	(ML) CLAYEY SILT, some sand, some gravel; grey; cohesive, w <pl, stiff<="" td=""><td></td><td>2.21</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>		2.21														
	rack	low S	gravei; grey; conesive, w <pl, stiπ<="" td=""><td></td><td>   </td><td>,</td><td>_  </td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>			,	_												
	B-45HD Track Mount	.Hol			1	4 S	S 10							0					
3	B-45	m O.L	(MIL) OILT company		183.73														
3		203 mm O.D. Hollow Stem Augers	(ML) SILT, some sand, some gravel; grey, with zones of medium sand (TILL);		2.97														
			non-cohesive, moist, compact	4 4		5 S	S 15						(	<b>b</b>					
																			$\nabla$
																			 Dec 8, 2014
4				9 4	182.59														
			(ML) CLAYEY SILT, some sand, some	1	4.11														
			gravel; grey (TILL); cohesive, w <pl, stiff<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>																
					1	6 S	S 16						0						
5					181.52														
		$\exists$	END OF BOREHOLE		5.18		$\dagger$	1											Water level in op
																			borehole measured
																			depth of 3.7 m below ground surface (Ele
6																			182.00 m) on December 8, 2014.
Ů																			
7																			
8																			
9																			
,																			
10																			
	L	_		1						L				L					
DE	PT	'H S	CALE							AF.	~ 11	er ates						LO	OGGED: AVR

#### **RECORD OF BOREHOLE:** 14-25

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 15, 2014 DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

ا يَا	Ę	[	SOIL PROFILE	L		SA	MPL		DYNAMIC PENET RESISTANCE, BL	OWS/	0.3m	Ϊ,		k, cm/				NG A	PIEZOMETER
METRES	RORING METHOD			STRATA PLOT		监		).3m	20 40	6						1	0-3 <u>1</u>	ADDITIONAL LAB. TESTING	OR STANDPIPE
ME	Ü		DESCRIPTION	TAF	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGT Cu, kPa	H n	at V. + em V. ⊕	Q - • U - O	1		CONTENT			DDIT B. TE	INSTALLATION
	ROR			3TR/	(m)	₹	'-	BLO							30 √W		WI 40	4 4	
$\dashv$		$\dashv$	GROUND SURFACE	0)	104.70			Ė	20 40	6	0 8	U	1	0	20 3	30 4	40		
0		$\dashv$	TOPSOIL (150 mm)	EEE	184.70	1A	00										1		
		Ī	FILL - (SM) SILTY SAND, trace gravel, trace rootlets; dark brown; non-cohesive,		0.15		SS							_			1		
			moist, loose	$\bowtie$		1B		5						0					
		-	(ML) CLAVEV SILT: mottled grey brown:		184.01 0.69														
		$ \cdot $	(ML) CLAYEY SILT; mottled grey-brown; cohesive, w <pl, firm<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>																
1			(SM) SILTY SAND, some gravel, trace clay; brown (TILL); moist, compact	2 4 4 4 A		2	SS	13						0					
					183.25														
		Ī	(ML) CLAYEY SILT, some sand, some gravel; brown to grey (TILL-LIKE);		1.45	┝													
			cohesive, w>PL, soft			3	SS	2						0					
2	Ħ					ľ		-						Ü					
	×₩	ايز																	
	TTrac	Jush S	(ML) Sandy SILT, some gravel, some clay; grey (TILL); non-cohesive, wet,		182.34 2.36														
	22 D	rect F	clay; grey (TILL); non-cohesive, wet, compact			4	SS	18						0					
	37 adı	J mr	,		181.73														
3	Geoprobe 7822 DT Track Mount	8	(ML) CLAYEY SILT, some sand, some		2.97														
	٥		gravel; grey, with zones of silt, layered (TILL); cohesive, dry to moist, very stiff			_	00												
					1	5	SS	21					0						
							-												
4																			
4					1														
																			_
													_						 Dec. 15, 2014
5						6	SS	27					С						
ŀ		$\dashv$	END OF BOREHOLE		179.52 5.18														1. Water level in op
																			borehole measured depth of 4.7 m belo
																			ground surface (Ele 180.80 m) on
																			December 15, 2014
6																			
7																			
8																			
9																			
10																			
рг.	ت	10	CALE							à									000ED: 41/2
υE	-11	7 5	CALE						( <i>₹</i> A	₽G	olde socia	r						L	OGGED: AVR

# **RECORD OF BOREHOLE: 14-26**

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 16, 2014

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

щ	QQ	SOIL PROFILE			SA	MPL	.ES	DYNAMIC PENET RESISTANCE, BL	RATION OWS/0.3	m		HYDRA	AULIC Co	ONDUCT	IVITY,	T		PIEZOMETER
DEPTH SCALE METRES	BORING METHOD		STRATA PLOT		监	ļ,	BLOWS/0.3m	20 40	60	80	١.	10			1	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
	RING	DESCRIPTION	ATA F	ELEV. DEPTH		TYPE	)/S/((	SHEAR STRENG Cu, kPa	TH nat ' rem	V. + Q V. ⊕ U	} - ●   - ○			ONTENT			TIOON	INSTALLATION
בֿ	BOF		STR	(m)	Įź		BLC	20 40		80						WI 40	~ )	
. 0		GROUND SURFACE	İ	193.10										Ĺ		Ĺ		
		TOPSOIL (50 mm) (CI) SILTY CLAY, some gravel, trace sand; brown (TILL); cohesive, w <pl, stiff="" stiff<="" td="" to="" very=""><td></td><td>8:89</td><td>1</td><td>ss</td><td>8</td><td></td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td><td></td></pl,>		8:89	1	ss	8						0					
1			X 2		2	SS	21											
2				190.89		SS	21						0					
		(ML) CLAYEY SILT, trace sand, some gravel; brown to grey (TILL); cohesive, w <pl, hard="" stiff<="" td="" to="" very=""><td></td><td>2.21</td><td>4</td><td>SS</td><td>34</td><td></td><td></td><td></td><td></td><td>C</td><td>)</td><td></td><td></td><td></td><td></td><td></td></pl,>		2.21	4	SS	34					C	)					
3					5	SS	32					(	D					
- 4																		
- 5		END OF BOREHOLE		187.92 5.18		SS	29					(	D					
6																		
7																		
- 8																		
9																		
10																		
DE		CCALE						Â	Go Asso	lder								OGGED: EWB

#### **RECORD OF BOREHOLE:** 14-27

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: SEE FIGURE 2

BORING DATE: December 17, 2014

ا پِد	HOD H	SOIL PROFILE	-	,	SAM	PLES	DYNAMIC PE RESISTANCE	, BLOWS	JN /0.3m	1	HIDRA	k, cm/s	ONDUCT	IVIII,	Ţ	ا وِږ	PIEZOMETER
TRES	MET		PLOT	ELEV.	띪.	- us		1	80 8				l		0-3 <sup>⊥</sup>	TION	OR STANDPIPE
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH (m)	NUMBER	BI OWS/0.3m	SHEAR STRE Cu, kPa	NGTH I	nat V. + rem V. ⊕	Q - • U - O		ATER CO				ADDITIONAL LAB. TESTING	INSTALLATION
	ā	CROLIND SUBSECS	ST	. ,	+		20	40 6	80 8	0	1	0 2	0 3	0 4	40		
0		GROUND SURFACE TOPSOIL (25 mm)	/XXX	192.50 9:99	+	+										+	
		FILL - (CI) SILTY CLAY, trace sand, trace gravel; cohesive, w <pl, firm<="" td=""><td>′‱</td><td>0.03</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>	′‱	0.03													
		trace gravel; cohesive, w <pl, firm<="" td=""><td><math>\otimes</math></td><td></td><td>1 8</td><td>SS 5</td><td></td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td><td></td></pl,>	$\otimes$		1 8	SS 5						0					
			$\otimes$	191.81													
		(ML) CLAYEY SILT, some gravel, trace sand; grey (TILL); w <pl, hard<="" stiff="" td="" to=""><td>1</td><td>0.69</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>	1	0.69													
1		Sand, grey (TILL), WAF L, Sun to Hard		1	2 8	SS 13						0					
					-   -												
				1													
				} [													
				1	3 8	SS 27						0					
2																	
				1	4 S	SS 72					0						
				<u> </u>	_												
3				1	-												
				]	5 8	SS 65					0						
				1													
4																	
7																	
				1													
				1	_												
				1							_						
5					6 8	SS   84					(						
ŀ		END OF BOREHOLE	1112	187.32 5.18	-	+	1										
6																	
7																	
8																	
٥																	
9																	
10																	
<u> </u>	יידח	COAL F.							Golde socia								CCED. EWE
υEl	LIH	SCALE					<b>[</b> ]	1111	مالاء							LO	GGED: EWB

#### **RECORD OF BOREHOLE:** 14-28

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 16, 2014

DATUM: Geodetic HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH −OW Wp F (m) GROUND SURFACE 185.70 TOPSOIL (200 mm) 1A FILL - (ML) CLAYEY SILT, some gravel, SS trace sand, trace organics; brown; cohesive, moist, stiff to very stiff 1B 2 SS 26 0 (CI) SILTY CLAY, trace sand; brown to grey, varved; cohesive, w>PL, stiff to very stiff SS 13 0 SS 0 21 5 SS 0 19 181.59 4.11 (ML) CLAYEY SILT, some gravel, trace sand; grey (TILL); cohesive, w<PL, very SS 20 180.52 END OF BOREHOLE 5.18 GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17 9 10

Golder

DEPTH SCALE

# **RECORD OF BOREHOLE: 14-29**

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 16, 2014

DATUM: Geodetic HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

\ HYDRAULIC CONDUCTIVITY,  $\neg$ 

"   Š	로	SOIL PROFILE	-		S	AMPL		DYNAMIC PENETRA RESISTANCE, BLO		,		k, cm/			]	[   NG	PIEZOMETER
METRES BOBINO METICOD	ا لا ا د	DEGOETER	STRATA PLOT	ELEV.	BER .	Ж	BLOWS/0.3m	20 40 SHEAR STRENGTH		80 ·			10 <sup>-5</sup> CONTEN		10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
¥   ¥		DESCRIPTION	TRATA	DEPTH (m)		TYPE	LOWS	Cu, kPa	rem V. €	) Ū- Ŏ			ON TEN		I WI	ADD LAB	INSTALLATION
	<u>"</u>	GROUND SURFACE	S	190.3	+		В	20 40	60	80	1	10	20	30	40		
0		TOPSOIL (150 mm)	EEE	0.0	0 1A		_										
		(CI) SILTY CLAY, trace sand, trace gravel; mottled grey-brown (TILL-Like); cohesive, w~PL, firm		0.1	5 1B	SS	8						6				
× Moun	5			189.7		-											
T Trac	83 mm Direct Push SVT	(ML) CLAYEY SILT, some gravel, trace sand; mottled grey-brown (TILL); cohesive, w <pl, hard<="" stiff="" td="" to="" very=""><td></td><td>0.6</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>		0.6	9												
1 ZZ8.	Direct F	cohesive, w <pl, hard<="" stiff="" td="" to="" very=""><td></td><td>}</td><td>2</td><td>SS</td><td>18</td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td><td></td></pl,>		}	2	SS	18					0					
probe	33 mm				$\vdash$	-											Bentonite
Geo	"																
2					3	SS	32					0					
	H	(ML) Sandy SILT, some gravel, trace		188.1	8												
		clay; brown to grey (TILL); dry to moist, very dense			4	SS	50/ 0.10				0						
		·															į.
3				:													Sand
			404		5	ss	50/ 0.15				0						
onut	S.		4 4														
Geoprobe 7822 DT Track Mount	150 mm Hollow Stem Augers		4														
2 DT T	w Sten																
be 782	에 H		4		6	ss	50/ .125										Screen
oudoe9 5	150 m		4 4	1	F	-	.125										
			4 4														Jan. 5, 2015
			4 A														
		(CI) SILTY CLAY, trace sand, trace gravel; grey (TILL); cohesive, w <pl,< td=""><td></td><td>184.7 5.6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,<>		184.7 5.6													
6		hard															
											_						
				400.0	7	SS	73				0						
		END OF BOREHOLE		183.6 6.7	1												Water level in operation of the level in operation of the level in operation.
7																	borehole measured depth of 5.0 m below ground surface (Ele
																	185.39 m) on Janua 5, 2015.
8																	
9																	
10																	
DEPT		CALE							Gold	er							OGGED: AVR
DEPT 1:50		CALE							Gold Associ	er ates							OGGED: AVR

#### **RECORD OF BOREHOLE:** 14-30

SHEET 1 OF 1

LOCATION: SEE FIGURE 2 BORING DATE: December 16, 2014 DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	CHECK	MEIHO	SOIL PROFILE	LOT			MPLE	-	DYNAMIC RESISTA 20	4	0	60	80	1	k, cm/s 0 <sup>-6</sup> 1	0 <sup>-5</sup>	10 <sup>-4</sup>	10-3	ADDITIONAL LAB. TESTING	PIEZOMETER OR
MET	OMIGOG	BORING MEI HOD	DESCRIPTION	STRATA PLOT	DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR S Cu, kPa				- Q - ● 9 U - ○ 80	W	·—	ONTEN	1	ENT WI 40	ADDITI LAB. TE	STANDPIPE INSTALLATION
0		$\dashv$	GROUND SURFACE		194.40				20					<u> </u>		Ĭ		Ť		
U			TOPSOIL (250 mm)		0.00 194.15															
			(ML) CLAYEY SILT, some gravel, trace sand; brown (TILL-LIKE); cohesive,	TTT	0.25		ss	3												
			sand; brown (TILL-LIKE); cohesive, w>PL, soft			1B														
		╽┟			193.71 0.69															
			(ML) CLAYEY SILT, some gravel, trace to some sand; (TILL); cohesive, w <pl,< td=""><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,<>		1															
1			stiff		1	2	ss	12								0				
					192.95															
		╽┟	(ML) Sandy SILT, some clay, some	4	1.45															
	L		(ML) Sandy SILT, some clay, some gravel; brown to grey (TILL); non-cohesive, moist to dry, dense to	X																
2	Moun	L	very dense			3	SS	17						· '	Þ					
2	rack	NS Y			]															
	T T	ct Pus		4 4																
	7822	Dire		4		4	ss	28							0					
	probe	83 mm Direct Push SVT		70	1															
3	Geo	"																		
						5	SS	26						0						
				4	1															
4																				
				9 4																
				V 4	189.55	6	ss	50/ .125						0						
5			END OF BOREHOLE		4.85															
6																				
7																				
8																				
•																				
9																				
10																				
DE	рт	H C	CALE							A									10	GGED: AVR
ے ں	. 1	اد،،								(₹		Gold	er ates							CKED: SDK

LOCATION: SEE FIGURE 2

#### **RECORD OF BOREHOLE:** 14-31

BORING DATE: December 16, 2014

DATUM: Geodetic

SHEET 1 OF 1

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE	TO:			MPLE		DYNAMIC PE RESISTANCI 20	E, BLOV	VS/0.3 60	Sm 8	0 ,		k, cm/s	6	CTIVITY,	10 <sup>-3</sup>	STING	PIEZOMETER OR
METR	RINGM	DESCRIPTION	STRATA PLOT	ELEV. DEPTH		TYPE	BLOWS/0.3m	SHEAR STRI Cu, kPa		- 1			w	ATER C	ONTEN	T PERC	ENT	ADDITIONAL LAB. TESTING	STANDPIPE INSTALLATION
נ	BO		STR	(m)	z		BL(	20	40	60	8	0				30	40 	1,1	
0		GROUND SURFACE (CL) SILTY CLAY; brown to grey,		182.70															
		varved; cohesive, w <pl, firm="" stiff<="" td="" to=""><td></td><td></td><td>1</td><td>ss</td><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>			1	ss	6												
					ľ														
1																			
'					2	SS	11								0				
					_														
					3	ss	11									9			
2				180.49															
		(CI) SILTY CLAY, trace sand, trace gravel; grey (TILL-LIKE); cohesive,		2.21															
		w>PL, firm			4	ss	8							0					
3		(CI) SILTY CLAY; grey, massive;		179.73 2.97															
		(CI) SILTY CLAY; grey, massive; cohesive, w>PL to a depth of 4.27 m, w <pl 4.27="" a="" below="" depth="" m,="" of="" stiff<="" td="" very=""><td></td><td></td><td>_</td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl>			_		_												
		to hard			5	SS	∠tó							С	<u>'</u>				
4																			
5					6	ss	N/ R							0					
Э		END OF BOREHOLE		177.52 5.18															
		*N/R - Not Recorded		5.18															
		"N/R - Not Recorded																	
6																			
7																			
8																			
9																			
-																			
10																			
				1	<u> </u>								l		1				
DE	PTH S	SCALE							D	Gn	ماراه	r						LO	GGED: EWB
1:	50								<b>U</b>	Lssc	cia	ites						CHE	CKED: SDK

#### 14-32 **RECORD OF BOREHOLE:**

DATUM: Geodetic

LOCATION: SEE FIGURE 2 BORING DATE: December 5, 2014

SHEET 1 OF 1

HAMMER TYPE: AUTOMATIC SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

щ	do		SOIL PROFILE			SA	MPL	ES	DYNAMIC PENETRA RESISTANCE, BLO	TION VS/0.3r	n	1	HYDR	AULIC C	ONDUCT	IVITY,	T	٥را	DIEZOMETED
DEPTH SCALE METRES	BORING METHOD		DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	20 40 SHEAR STRENGTH Cu, kPa	60 nat V	8( /. + V. ⊕		W	ATER C	ONTENT	PERCE		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
DE	BOR	+	ODOLIND CUDEACE	STRA	(m)	₹		BLO	20 40	60	80			0	<del>V</del> 20 3		WI IO	ĀŠ	
- 0		†	GROUND SURFACE TOPSOIL (100 mm) FILL - (CI) SILTY CLAY, trace sand, trace gravel; brown, containing organics; cohesive, w>PL, stiff		194.90 0.00 0.10	1A 1B	SS	12							•				
- 1			FILL - (SM) SILTY SAND, trace gravel, trace silt; brown/grey; non-cohesive, moist, loose		194.21 0.69 193.76	2	ss	7					0						
			FILL - (CL) SILTY CLAY, some sand, trace gravel; mixed brown and grey, containing organics; cohesive, w <pl, firm</pl, 		1.14	3	ss	6											
2	Mount	n Augers			192.46		33	0						`					
. 3	B-45HD Track Mount	2 mm Solid Ster	(ML) CLAYEY SILT, some sand, some gravel; grey (TILL-LIKE); cohesive, firm		2.44	4	ss	6						(					
5			(SM) SILTY SAND, trace gravel; grey; non-cohesive, moist, compact	/a/h	191.80 3.10	5	ss	16					0						
4																			
						6	ss	19						(				мн	
- 5			END OF BOREHOLE		189.72 5.18														Open borehole dry upon completion of drilling on Dec. 5, 20
6																			
- 7																			
- 8																			
- 9																			
- 10																			
DE 1:		ısc	CALE							Go	lde	ŗ							DGGED: AVR ECKED: SDK

GTA-BHS 001 1413472.GPJ GAL-MIS.GDT 9/12/17 MK Sept. 12/17

LOCATION: SEE FIGURE 2

## RECORD OF BOREHOLE: 14-33

SHEET 1 OF 1

ATE: December 5 2014

DATUM: Geodetic

BORING DATE: December 5, 2014

HAMMER TYPE: AUTOMATIC

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

Section   Sect		_	_	SOIL PROFILE			SA	MPL	ES	DYNAMIC PENETRATION \ RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	(D	
CELLIUS SUPERACE  1	SCAL	I H			LOT		œ		.3m	1	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup>	ONAL	
CECUNO SISTEMACE   Section   Secti	PTH 8	U.S.		DESCRIPTION	TAPI		MBE	YE	NS/0.	SHEAR STRENGTH nat V. + Q - ●	WATER CONTENT PERCENT	DOITI B. TE	
ORDER SUPPLIES   Section	DE	BOR			TRA		₹	-	BLO		Wp	ZZ	
TOPSONE (150 perm)   TOPSONE			$\dashv$	GROUND SURFACE	0)	104 67				20 40 60 80	10 20 30 40		
2 500 to Commence, controlled growth company some grower, controlled growth covaring growth growth company some growth growth company some growth gro	_ 0 -	Н	$^{+}$	TOPSOIL (150 mm)	EEE		1A						-
2 500 to Commence, controlled growth company some grower, controlled growth covaring growth growth company some growth growth company some growth gro	-		Γ	(CL) SILTY CLAY, trace gravel; mottled		0.15		SS	10				=
Section   Sect				zones; cohesive, w>PL, stiff			18						
Section   Sect	Ē												
Section   Sect	- - 1												
SAND SILTY SAND, serve step of the step	- '						2	SS	12				
Description   Description	_						H						= =
Description   Description	-			(SM) SILTY SAND, some clay, some gravel: mottled grev-brown to grev:		1.45							
Sand	-			non-cohesive, moist to wet, compact			3	SS	12				
4 95 22  (CL) sandy SLTY CLAY, trace to borne private grey (Tk.1), corresive, mold, stiff 5 88 12  (SP) SAND, fine grained, trace sitt grey, with layers of clayery sit, moist, compact  (SP) SAND, fine grained, trace sitt grey, 7 7.16  (SP) SAND, fine grained, trace sitt grey, 8 7.16  (SP) SAND, fine grained, trace sitt grey, 7 7.16  (SP) SAND, fine grained, trace sitt grey, 8 7.16  (SP) SAND, fine grained, trace sitt grey, 9 7.16  (SP) SAND, fine grained, fi	_ 2												
C(L) sandy SiLTY CLAY, trace to some gravet, resystant to hard   Some continues of the property (TLL); coheave, most, still   Some continues of the property of the coheave, most, still   Some cohe	_												Bentonite _
C(L) sandy SiLTY CLAY, trace to some gravet, resystant to hard   Some continues of the property (TLL); coheave, most, still   Some continues of the property of the coheave, most, still   Some cohe	-												
CCL) sandy SILTY CLAY, trace to some grey (TILL), cohesive, most, stiff librard (rep (FILL)), stiff librard (rep (FILL)), cohesive, most, stiff librard (rep (FILL)), stiff librard	_						4	SS	21				
gravel; grey (TILL); cohesive, moist, sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard a sit grey (TILL); sliff to hard	Ē,		-	(OL)		191.70							■3
Section   Sect	<b>†</b>		- 1	gravel; grey (TILL); cohesive, moist, stiff		2.97							<u> </u>
6 SS 16  7 SS 66  7 SS 66  7 SS 66  O  Screen  187.51  8 SS 21  END OF BOREHOLE  8 22  END OF BOREHOLE  8 23  188.21  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	_		- 1	to hard			5	SS	12		0		Jan. 5, 2015
6 SS 16  7 SS 66  7 SS 66  7 SS 66  O  Screen  187.51  8 SS 21  END OF BOREHOLE  8 22  END OF BOREHOLE  8 23  188.21  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	-		vugers										
6 SS 16  7 SS 66  7 SS 66  7 SS 66  O  Screen  187.51  8 SS 21  END OF BOREHOLE  8 22  END OF BOREHOLE  8 23  188.21  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.		Mount	tem A										
6 SS 16  7 SS 66  7 SS 66  7 SS 66  O  Screen  187.51  8 SS 21  END OF BOREHOLE  8 22  END OF BOREHOLE  8 23  188.21  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	- 4 -	rack	Now S										
6 SS 16  7 SS 66  7 SS 66  7 SS 66  O  Screen  187.51  8 SS 21  END OF BOREHOLE  8 22  END OF BOREHOLE  8 23  188.21  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	_	SHD T	유										를 구 지 자 -
6 SS 16  7 SS 66  7 SS 66  7 SS 66  O  Screen  187.51  8 SS 21  END OF BOREHOLE  8 22  END OF BOREHOLE  8 23  188.21  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	-	B-4	Ē.										Sand Sand
Screen  7 SS 66  (SP) SAND, fine grained, trace silt, grey, with layers of clayey silt; moist, compact  8 SS 21  END OF BOREHOLE  8 22  10  11  11  12  13  14  15  15  15  15  16  17  16  17  18  18  19  19  10  10  10  10  10  10  10  10			203 n										
Screen  7 SS 66  7 SS 66  (SP) SAND, fine grained, trace silt, grey, with layers of clayey silt, moist, compact  8 SS 21  END OF BOREHOLE  8 22  187.51  8 SS 21  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 91.45 m) on January 5, 2015.	- - - 5						6	SS	16		φ	МН	
7 SS 66  (SP) SAND, fine grained, trace silt; grey, with layers of clayey silt; moist, compact  8 SS 21  END OF BOREHOLE  187.16  8 SS 21  188.44  1. Water level in piezometer measured at a depth of 322 m below ground surface (Elev. 191.45 m) on January 5, 2015.	- -												
7 SS 66  (SP) SAND, fine grained, trace silt; grey, with layers of clayey silt; moist, compact  8 SS 21  END OF BOREHOLE  187.16  8 SS 21  188.44  1. Water level in piezometer measured at a depth of 322 m below ground surface (Elev. 191.45 m) on January 5, 2015.	-												
7 SS 66  (SP) SAND, fine grained, trace silt; grey, with layers of clayey silt; moist, compact  8 SS 21  END OF BOREHOLE  187.16  8 SS 21  188.44  1. Water level in piezometer measured at a depth of 322 m below ground surface (Elev. 191.45 m) on January 5, 2015.	-												
7 SS 66  (SP) SAND, fine grained, trace silt; grey, with layers of clayey silt; moist, compact  8 SS 21  END OF BOREHOLE  187.16  8 SS 21  188.44  1. Water level in piezometer measured at a depth of 322 m below ground surface (Elev. 191.45 m) on January 5, 2015.													
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(SP) SAND, fine grained, trace silt; grey, with layers of clayey silt; moist, compact  8 SS 21  END OF BOREHOLE  186.44  8.23  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	-												
SP) SAND, fine grained, trace silt; grey, 7.16  8 SS 21  END OF BOREHOLE  186.44  8.23  END OF BOREHOLE  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	-						7	SS	66				
SP) SAND, fine grained, trace silt; grey, 7.16  8 SS 21  END OF BOREHOLE  186.44  8.23  END OF BOREHOLE  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	-												
SP) SAND, fine grained, trace silt; grey, 7.16  8 SS 21  END OF BOREHOLE  186.44  8.23  END OF BOREHOLE  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	- 7												
8 SS 21  END OF BOREHOLE  186.44  8.23  END OF BOREHOLE  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	- '		ŀ	(SP) SAND fine grained trace silt: grey									
END OF BOREHOLE  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	_			with layers of clayey silt; moist, compact									
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END OF BOREHOLE  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	E						ا	90	21				]
END OF BOREHOLE  8.23  1. Water level in piezometer measured at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	- 8 -						ľ	33	21				-
at a depth of 3.22 m below ground surface (Elev. 191.45 m) on January 5, 2015.	F	H	+	END OF BOREHOLE			H						1. Water level in
- 9   January 5, 2015 10	Ē												at a depth of 3.22 m
- 9   January 5, 2015 10	E												below ground surface [ (Elev. 191.45 m) on
	- - 9												January 5, 2015
	ţ ĺ												
	Ė												
	E												]
	<u>t</u>												
DEPTH SCALE  1:50  LOGGED: AVR  ASSOCIATES  CHECKED: SDK	10												
DEPTH SCALE  1:50  LOGGED: AVR  CHECKED: SDK	<u> </u>												
1:50 THECKED: SDK	DE	PTH	H SC	CALE						Caldan		LC	DGGED: AVR
	1:	50								Associates		СН	ECKED: SDK

LOCATION: SEE FIGURE 2

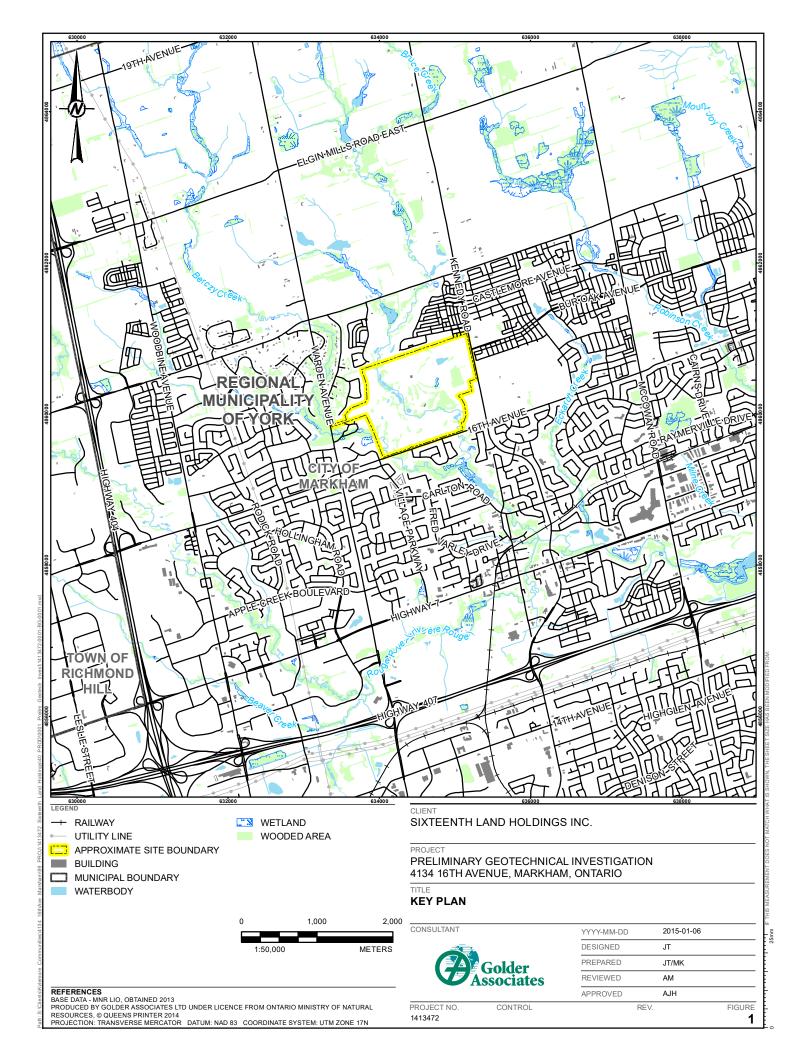
# **RECORD OF BOREHOLE: 14-34**

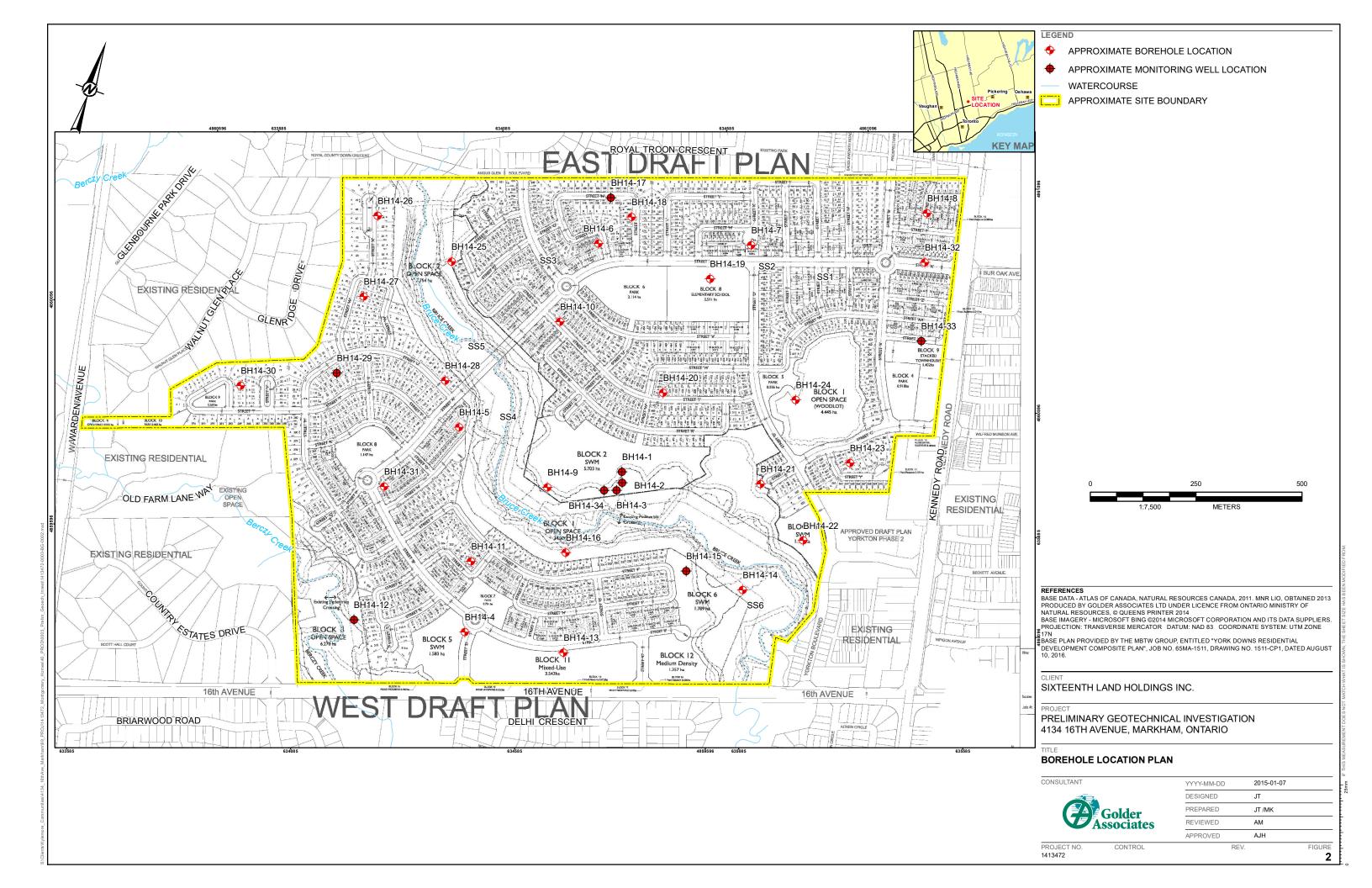
BORING DATE: December 8, 2014 DATUM: Geodetic

HAMMER TYPE: AUTOMATIC

SHEET 1 OF 1

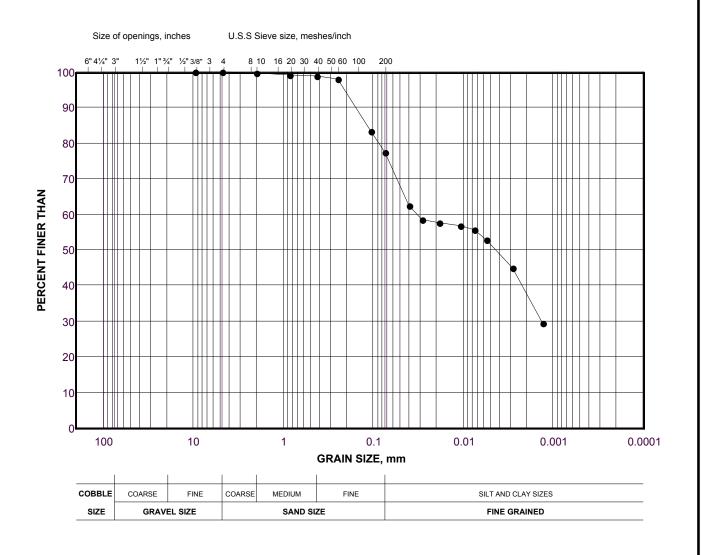
<u>"</u>	호	SOIL PROFILE			SA	MPLE	_3	DYNAMIC PENETRA RESISTANCE, BLOW	/S/0.3m			k, cm/s	;		ᆜᆜ의	PIEZOMETER
METRES	BORING METHOD		LOT	]	~		.3m	20 40	60	80 `		10 <sup>-6</sup> 1	0-5 1	D <sup>-4</sup> 10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR
ĘĘ.	197	DESCRIPTION	ΑP	ELEV.	NUMBER	TYPE	/S/0.	SHEAR STRENGTH	nat V.	+ Q - •	٧	VATER C	ONTENT	PERCENT	T 5 "	STANDPIPE INSTALLATION
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	Ф		ις.	. ,		$\dashv$	В	20 40	60	80	-			0 40	-	
0	_	GROUND SURFACE ASPHALT	_	180.40 0.00	1A	-					<u> </u>	+			-	
		GRANULAR FILL	***	0.15			10									
			$\otimes$		1B	ss					0					
																Bentonite
		(0)40 0		179.56 0.84												
1		(SW) Gravelly SAND, trace silt; brown; non-cohesive, moist to wet, compact	•	0.04	2	ss	11				0					$\leftarrow$
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																Sand
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2		igers	•													8
	ount,	통 	• •	178.04												
	ة   <u>₹</u>	(SM) SILTY SAND, fine grained, some	ΪÏ	2.36												
	<u>"</u>   :	(SM) SILTY SAND, fine grained, some gravel, trace clay; grey; non-cohesive, wet, compact to very loose			4	SS	12					С	1			l X
	345 <u>F</u>	O.D.														l 8
3	B-45HD Track Mount	3 माम														Screen
	8	50		]	5	ss	we					0				
				1	٦	55	***									
		(CM) CILTY CAND 5		176.67												
		(SM) SILTY SAND, fine grained, trace clay; grey; non-cohesive, wet, compact		3.73												
4					6	ss	17						0		мн	
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																🛚
5					7	SS	14						P			
1		END OF BOREHOLE	111	175.22 5.18												1. Water level in
		END OF BOKEHOLE		3.10												piezometer measure at a depth of 1.17 m
																below ground surfact (Elev. 179.23 m) on
																(Elev. 179.23 m) or January 5, 2015.
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	_		$\perp$													
DEF	TH	1 SCALE													1.0	OGGED: AVR





(CI) SILTY CLAY

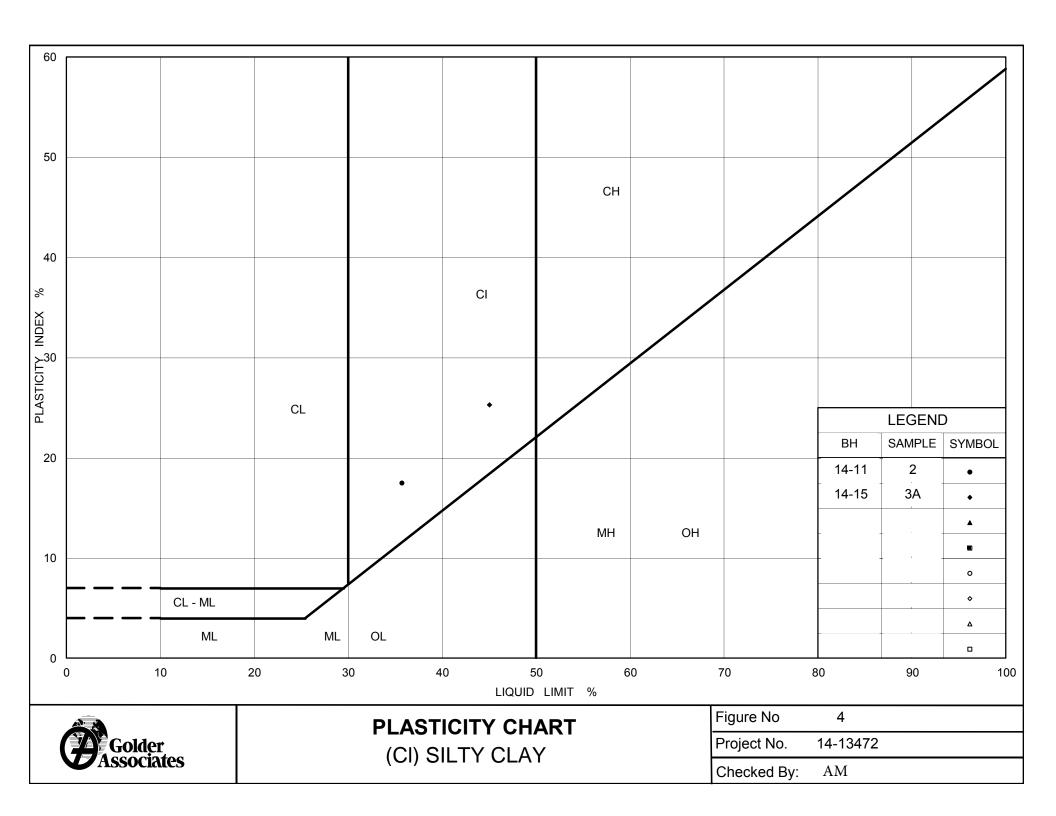
FIGURE 3



## **LEGEND**

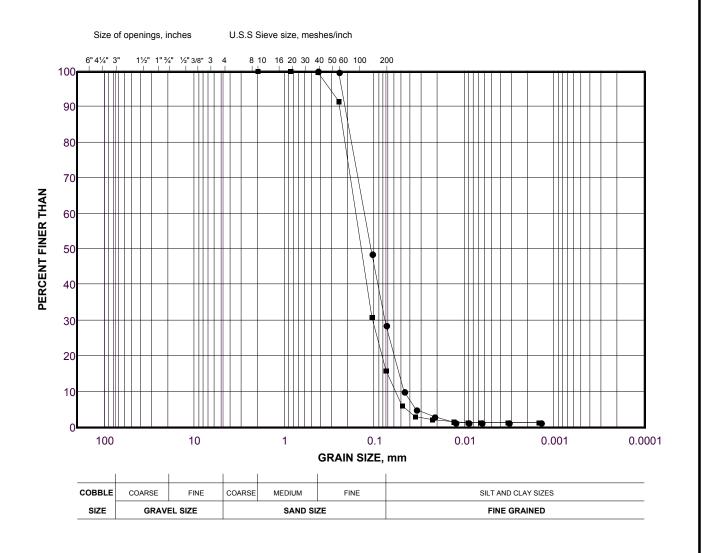
SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-9	6	4.6 - 5.2

Project Number: 14-13472



(SM) SILTY SAND

FIGURE 5



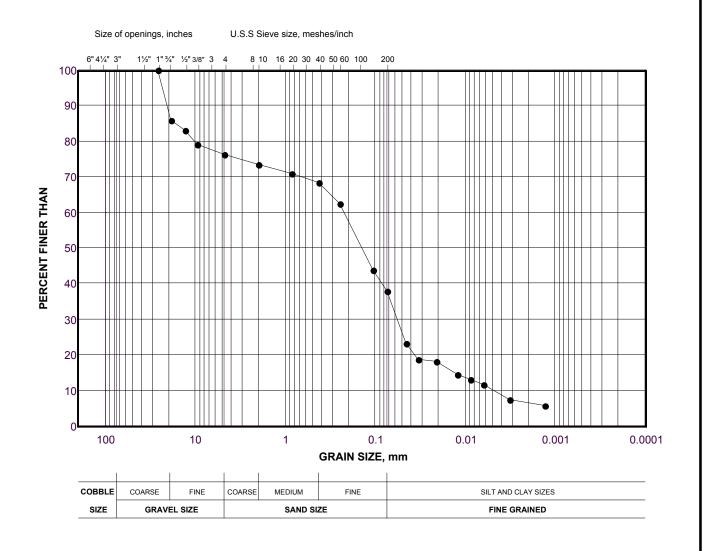
## **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-32	6	4.6 - 5.2
•	14-15	7	6.1 - 6.7

Project Number: 14-13472

(SM) gravelly SILTY SAND

FIGURE 6



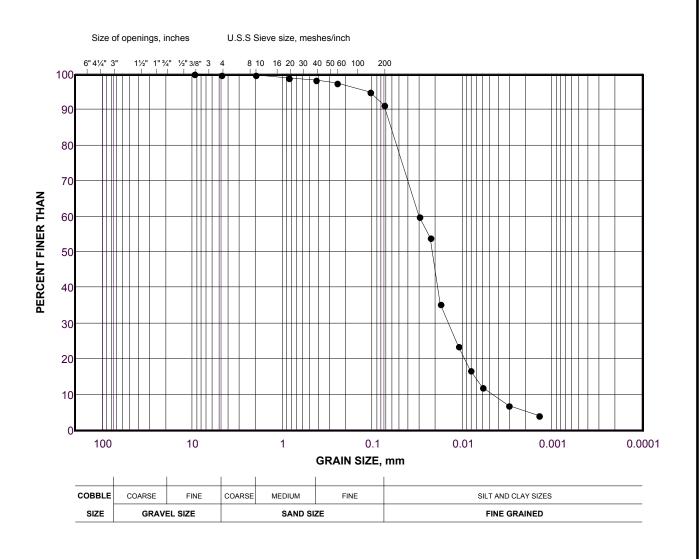
### **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-11	6	4.6 - 5.2

Project Number: 14-13472

(ML) SILT

FIGURE 7



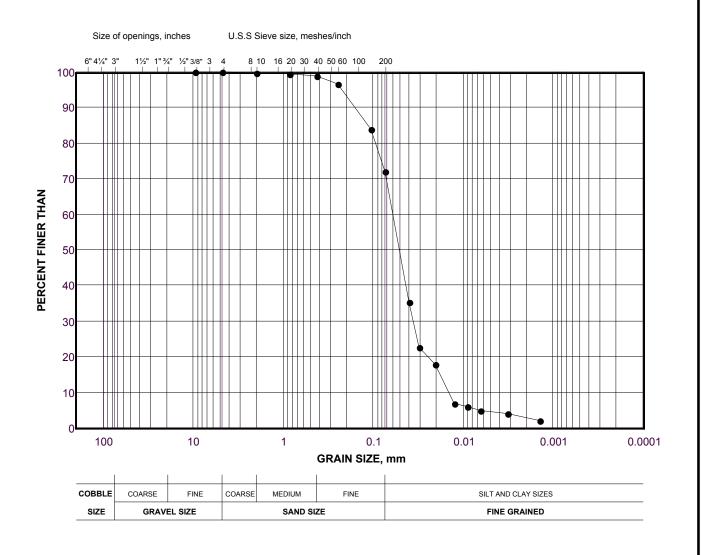
## **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-14	6	46-52

Project Number: 14-13472

(ML) sandy SILT

FIGURE 8



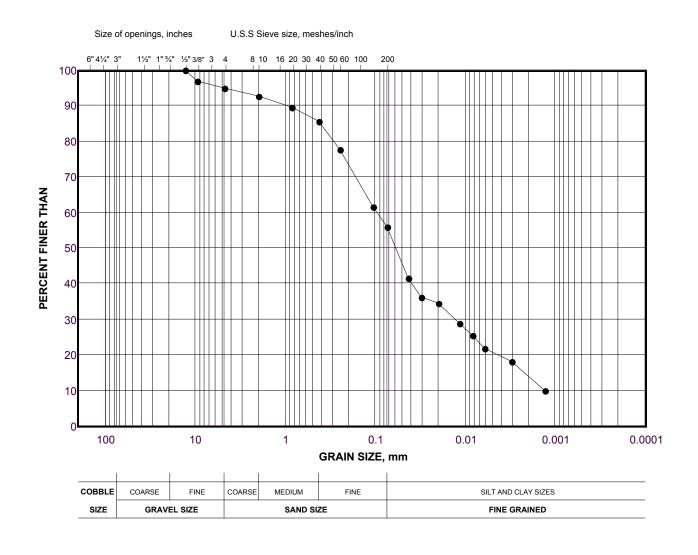
## **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-34	6	3.8 - 4.4

Project Number: 14-13472

(ML) CLAYEY SILT and SAND (TILL-LIKE)

FIGURE 9



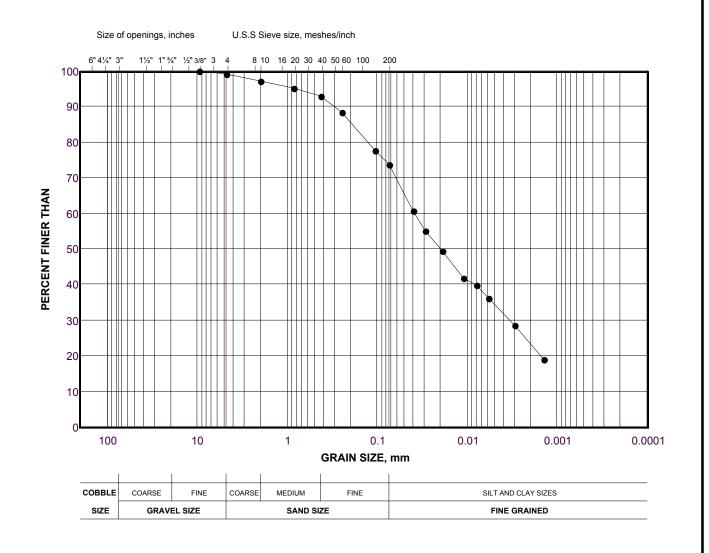
## **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-23	4	2.3 - 2.9

Project Number: 14-13472

(CL) SILTY CLAY (TILL)

FIGURE 10



### **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-33	6	4.6 - 5.2

Project Number: 14-13472

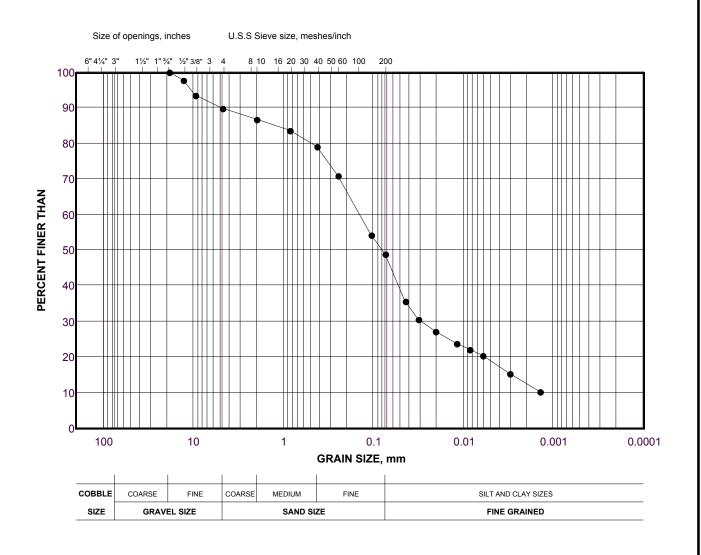
Checked By: AM

**Golder Associates** 

Date: 21-Sep-16

(ML) CLAYEY SILT and SAND (TILL)

FIGURE 11



## **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-9	4	2.3 - 2.7

Project Number: 14-13472

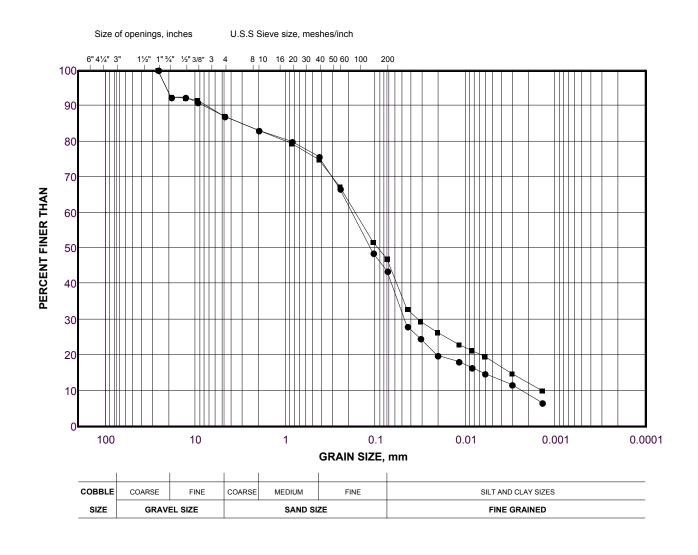
Checked By: AM

**Golder Associates** 

Date: 21-Sep-16

(SM) SILTY SAND (TILL)

FIGURE 12



## **LEGEND**

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	14-10	3	1.5 - 2.1
•	14-23	6	4.6 - 5.2

Project Number: 14-13472

# PRELIMINARY GEOTECHNICAL INVESTIGATION RESIDENTIAL DEVELOPMENT

# **APPENDIX A**

**Important Information and Limitations of This Report** 





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#### IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

**Standard of Care:** Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder can not be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

**Soil, Rock and Ground water Conditions:** Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

1 of 2

#### IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

**Sample Disposal:** Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

**Follow-Up and Construction Services:** All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



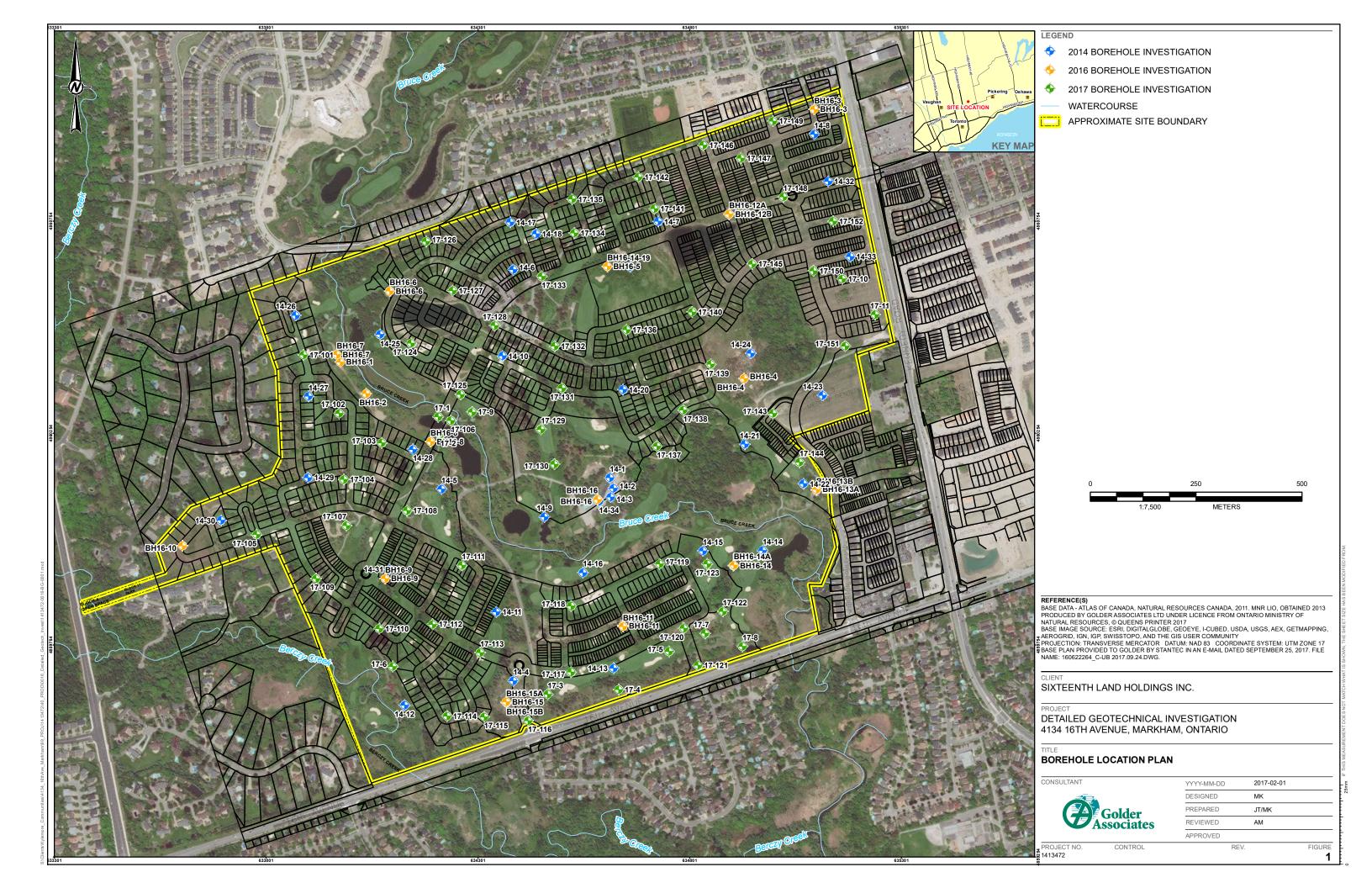


# PRELIMINARY GEOTECHNICAL INVESTIGATION RESIDENTIAL DEVELOPMENT

# **APPENDIX B**

**Additional Detailed Design Boreholes** 





1:50

LOCATION: N 4860422.01; E 633976.14

### RECORD OF BOREHOLE: 16-1

BORING DATE: February 29 to March 1, 2016

DATUM: Geodetic

CHECKED: OS

SHEET 1 OF 2

HAMMER TYPE: AUTOMATIC SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH <u>-</u>₩ Wp ⊢ (m) GROUND SURFACE 187.38 TOPSOIL 0.00 SS 8 187.00 0.38 (CL-ML) Sandy CLAYEY SILT, trace gravel; brown to dark brown to grey; cohesive, w>PL, stiff to very stiff 2 ss 17 (SM) SILTY SAND, trace gravel, some cohesive fines; brown to grey, oxidation staining to a depth of 3.8 m (TILL); moist, 1.52 SS 49 0 non-cohesive, very dense - Fibrous organics noted to a depth of 2.1 m SS 62 SS 5 69 S:CLIENTSIRUNNYMEDEIYORK DOWN GOLF COURSE\02 DATA\GINT\1413472 FROM RUNNYMEDE.GPJ GAL-MIS.GDT 4/18/16 -Becoming grey below a depth of 3.8 m CME-85 TRUCK MOUNTED - POWER AUGER SS 53 0 182.88 4.50 (CL-ML) Sandy SILTY CLAY to Sandy CLAYEY SILT, trace to some gravel; grey (TILL); cohesive, w<PL to w~PL, very stiff to hard SS 24 SS 8 25 9 SS 23 **6**—1 MH/AL 9 SS 57 10 CONTINUED NEXT PAGE GTA-BHS 001 DEPTH SCALE LOGGED: DM Golder

LOCATION: N 4860422.01; E 633976.14

## RECORD OF BOREHOLE: 16-1

BORING DATE: February 29 to March 1, 2016

SHEET 2 OF 2

DATUM: Geodetic

ш,	0	SOIL PROFILE			SA	WIPLE		DYNAMIC PEN RESISTANCE,	BLOWS	/0.3m	į		k, cm/s	NDUCT	IVIII,	Т		
DEPTH SCALE METRES	BORING METHOD		TO.		~						0 ,	10		) <sup>-5</sup> 10	)-4 1	<sub>о³</sub> Т	ADDITIONAL LAB. TESTING	PIEZOMETER OR
ATT	NG N	DESCRIPTION	IA PL	ELEV.	NUMBER	TYPE	.0/S/	SHEAR STREE	1		Q - •	W	ATER CO	ONTENT	PERCE	NT	DITIC	STANDPIPE INSTALLATION
DEF	SORII		STRATA PLOT	DEPTH (m)	NON		BLOWS/0.3m										LAB	INOTALEATION
	ш		-	, ,				20	10	8 06	0	1	0 2	0 3	0 4	10		
- 10		CONTINUED FROM PREVIOUS PAGE (CL-ML) Sandy SILTY CLAY to Sandy				$\dashv$	+											
		CLAYEY SILT, trace to some gravel; grey (TILL); cohesive, w <pl to="" w~pl,<br="">very stiff to hard</pl>																
	监	very stiff to hard																
	AUG																	
- 11	WER				11	ss .	48					0						
- ''	O - PC tem A																	<u></u>
	NTE																	March 1, 2016
	MOL D.D. S																	
	RUCK mm (																	
12	CME-85 TRUCK MOUNTED - POWER AUGER 100 mm O.D. Solid Stem Augers																	
	CME																	
					12	ss	37					c	)					
				174.58														
- 13		END OF BOREHOLE		12.80									]					
		NOTES:																
		Water level measured in open borehole at a depth of 11.2 m upon																
		completion of drilling.																
- 14																		
- 15																		
- 16																		
- 17																		
- 18																		
- 19																		
- 20																		
				1					<u> </u>	1		<u> </u>						
DE	PTH S	CALE							A.	Golde Socia							LC	OGGED: DM

## **RECORD OF BOREHOLE:** 16-2

SHEET 1 OF 2 DATUM: Geodetic

LOCATION: N 4860347.14; E 634037.23 BORING DATE: March 1, 2016

	_			I				NETDAT						IV/I I Y		
ш	BORING METHOD	SOIL PROFILE	1.		SAN	IPLES	DYNAMIC PE RESISTANC	E, BLOWS	6/0.3m	1	птыку	k, cm/s	ONDUCT		وَٰذِ	PIEZOMETER
DEPTH SCALE METRES	MET		STRATA PLOT		~	8	20	40	60 8	0 '	10	0 <sup>-6</sup> 1	0 <sup>-5</sup> 10	0-4 10-3	ADDITIONAL LAB. TESTING	OR
Ę Į	√ 9Z	DESCRIPTION	A PI	ELEV.	NUMBER	TYPE	SHEAR STR	ENGTH	nat V. +	Q - •	W	ATER C	ONTENT	PERCENT	TÉ#.	STANDPIPE
בֻ	JRIN	DEGGINI HOIN	₹AT,	DEPTH	3	<b>←</b>  }	Cu, kPa		rem V. $\oplus$	U - O		p	- W		ADI.	INSTALLATION
_	B		STF	(m)	_	ā	20	40	60 8	0				0 40	-	
		GROUND SURFACE		185.36												
0		TOPSOIL	EEE	0.00	1A											
		(CL) Cond. Cll TV Cl AV topog are all		185.06 0.30		ss s										
		(CL) Sandy SILTY CLAY, trace gravel; brown to dark brown, trace fibrous		0.30	1B							0				
		organics; cohesive, w>PL, soft to firm		1												
				1 1												
1				1 1	2 :	ss :										
					-											
				183.91												
		(CL-ML) Sandy CLAYEY SILT to Sandy SILTY CLAY, trace to some gravel; brown to grey (TILL); cohesive, w <pl,< td=""><td></td><td>1.45</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,<>		1.45												
		brown to grey (TILL); cohesive, w <pl,< td=""><td></td><td>1 1</td><td>3 3</td><td>SS 1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,<>		1 1	3 3	SS 1										
2		stiff to very stiff		1 1		٠   ١						,	ĺ			$\nabla$
-																March 1, 2016
				]												
				1	4 5	SS 2					С					
		- Becoming grey below a depth of 2.6 m			7	2						1				
				]												
3				]												
					5 5	SS 2					_	\				
				1 1	,	55   2						1				
				1												
				1												
4	ا ي			1	6	SS 2						<u> </u>			MH/AL	
	삥			1 1	,	55   2					(				IVIT/AL	
	BIS A			1												
	Aug			1												
	CME-85 TRUCK MOUNTED - POWER AUGER 100 mm O.D. Solid Stem Augers			1	7 3											
5	E S			1 1	<b>'</b>	SS 2					С	1				
	MO.			1												
	> 등			1 1												
	19 3			179.72												
	쀻	- Auger grinding on probable	19	5.64												
- 6	٥	\cobbles/boulders at a depth of 5.6 m (ML) Sandy SILT, some cohesive fines,														
١		trace gravel; grey (TILL); non-cohesive,														
		moist, dense to very dense		]		.										
			4	1	8 3	SS 5					С	1				
				]												
7			10													
				]												
											_					
8				1	9 :	SS 4					С	1				
			40	1												
9			4 6	]												
			90 9	1	10	SS 6					(	0				
10				T	-†	7			T				T		_	
		SSMOLD NEXT FACE														
רבי	DTLIC	SCALE							Golde ssocia						1.0	DGGED: DM
							#7 ∃									

## **RECORD OF BOREHOLE:** 16-2

SHEET 2 OF 2 DATUM: Geodetic BORING DATE: March 1, 2016

LOCATION: N 4860347.14; E 634037.23

	7001	PT HAMMER: MASS, 64kg; DROP, 760mm	l							
щ	QQ	SOIL PROFILE			SAN	/PLE	S	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	J © DIEZOMETED
DEPTH SCALE METRES	BORING METHOD		LOT		٦		- 1	20 40 60 80	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup>	PIEZOMETER OR STANDPIPE INSTALLATION
A H	NG	DESCRIPTION	IA PI	ELEV.	NUMBER	TYPE	.0/S/	SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○	WATER CONTENT PERCENT	STANDPIPE INSTALLATION
DEF	30RII		STRATA PLOT	DEPTH (m)	Š	F	BLOWS/0.3m		Wp - Wi	LAE LEE
				(,		-   '	В	20 40 60 80	10 20 30 40	
- 10	$\dashv$	CONTINUED FROM PREVIOUS PAGE (ML) Sandy SILT, some cohesive fines,	Li Ti.			+	+			
		trace gravel; grey (TILL); non-cohesive,	2 4 4 A A							
		moist, dense to very dense	4 4	1						
	R AL		4	1 1						
1	Auge			] [						
- 11	ge   B			:	11	ss :	54			
	N N N N N N N N N N N N N N N N N N N									
Š	MO.		4	1 [						
1	5 TRUCK MOUNTED - POWER. 100 mm O.D. Solid Stem Augers		9,14	1 1						
1	35 TF									
12	CME-85 TRUCK MOUNTED - POWER AUGER 100 mm O.D. Solid Stem Augers			]						
l'	~		70 4	<u> </u>		١,	50/			
-	Щ	END OF BOREHOLE	4.	172.94 12.42	12	ss o	80.0		0	
				12.42						
		NOTES:								
13		Water level measured in open borehole at a depth of 2.0 m upon								
		completion of drilling, March 1, 2016								
14										
15										
40										
16										
17										
"										
18										
19										
20										
$\perp \! \! \perp$										
DEF	PTH S	SCALE						Golder Associates		LOGGED: DM

LOCATION: N 4861018.31; E 635094.77

## **RECORD OF BOREHOLE:** 16-3

BORING DATE: February 24, 2016

SHEET 1 OF 1

DATUM: Geodetic

щ	ДОР	SOIL PROFILE			SA	MPLE	S	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	F	HYDRAULIC CONDUCT k, cm/s	IVITY,	G G	DIEZOMETED
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80 SHEAR STRENGTH nat V. + Q- cu, kPa rem V. ⊕ U-	` • • • • • • • • • • • • • • • • • • •	10 <sup>-6</sup> 10 <sup>-5</sup> 10 WATER CONTENT Wp I → W	i	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	BC	GROUND SURFACE	STE	(m)	_		В	20 40 60 80	+	10 20 3		_	
- 0	Т	TOPSOIL	EEE	197.56 0.00 197.36	1A				+				Concrete
· 1		(CL) SILTY CLAY, some sand to sandy, trace to some gravel; light brown to light brown mottled grey, oxidation staining, fibrous organics; cohesive, w~PL, stiff		0.20	1B		9			0			Cuttings
2		(SM) SILTY SAND, some gravel, trace to some cohesive fines; brown to grey, oxidation staining (TILL); non-cohesive, moist, compact to dense - Auger grinding on probable cobbles/boulders from depths of 1.5 m to 2.1 m	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	196.11	3	ss :	28			•			
	OWER AUGER		4 4 4 4 4 4		4	SS	48			0			Bentonite
- 3	MOUNTED - PC		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		5	ss :	30			0			
4	CME-85 TRUCK MOUNTED - POWER AUGER	(ML/SM) Sandy SILT to SILTY SAND; grey; non-cohesive, moist to wet, dense	4 4 4	193.83	6	ss :	33			0			Sand
	0	- 50 mm thick sand seam at a depth of 4.3 m		400.00	7A					Q			 March 11, 2016
- 5		(SP) SAND, fine, some fines; grey; non-cohesive, wet, dense		192.68 4.88	7B	SS :	36			0		М	Screen
- 6		(SM) SILTY SAND, some gravel, some cohesive fines; grey (TILL); non-cohesive, moist, compact	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	190.85	8	SS :	25			0			Sand
7		END OF BOREHOLE  NOTE:  1. Water level measured in open borehole at a depth of 5.9 m upon completion of drilling, February 24, 2016.		6.71									
- 8		Water level measured in monitoring well at a depth of 4.71 m, March 11, 2016.											
- 9													
10													
DE	PTH	SCALE						Golder				L	OGGED: DM

## RECORD OF BOREHOLE: 16-4

LOCATION: N 4860382.52; E 634929.27

BORING DATE: February 23, 2016

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

SHEET 1 OF 1

S	9	HOD .	SOIL PROFILE	F	l		MPL		DYNAMIC RESISTA	NCE, E	BLOW:	S/0.3m	,		k, cm/			<u>.</u> ]	ING ING	PIEZOMETER
DEPTH SCALE METRES		BORING MEI HOU	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	SHEAR S Cu, kPa	TREN	GTH	nat V. rem V.	80 + Q - ● ⊕ U - ○	W	ATER C	ONTENT	PERCE		ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
_	- 2	<u> </u>	ODOLIND GUDEAGE	ST	(m)			BL	20	41	0	60	80					40	<u> </u>	
- 0			GROUND SURFACE TOPSOIL	ESS	184.71 0.00															Concrete
			(CL) CILTY CLAY and the seed and		184.41		SS	5												
			(CL) SILTY CLAY, sandy to some sand, trace to some gravel; dark grey to brown		0.30	1B										0				Sand
			mottled grey, fibrous organics; cohesive, w~PL to w>PL, firm to stiff																	
. 1						2	SS	5												2
						-	00													
																				abla
																				March 11, 2016
2						3	SS	11								1				Bentonite
	监																			
	₹ AUG	Sis			1	4	SS	15								¢				
3	OWEF	Stem Augers				$\vdash$														Sand
ŭ	TRUCK MOUNTED - POWER AUGER	w Ster	- Auger grinding on probable cobbles/boulders at a depth of 3.1 m																	
	OUNT	. Hollow 8				5	SS	16							0					
	UCK M	mm O.D.	(CM) Converte Off TV CAND		180.98															
4	85 TR	200 m	(SM) Gravelly SILTY SAND, some cohesive fines; grey (TILL); non-cohesive, moist, compact to dense	4 4	3.73															
	CME	200 г	non-coriesive, moist, compact to dense	4 4		6	SS	13						0						
				4 4		L														
				444																Screen
5				4 4		7	SS	40						0					МН	
				A 4																
				A & A																
6				7 A																
				A 4																
				A A		8	SS	26						0						Sand
		Н	END OF BOREHOLE	4	178.00 6.71															<u> </u>
7			NOTE:																	
			Water level measured in open																	
			borehole at a depth of 5.5 m upon completion of drilling, February 23, 2016.																	
			2. Water level measured in monitoring well at a depth of 1.55 m, March 11,																	
8			well at a depth of 1.55 m, March 11, 2016.																	
9																				
10																				
DF	PT	H S	CALE																L	OGGED: DM
		-							1	\ <del>7</del>		Gold	er iates							ECKED: OS

## **RECORD OF BOREHOLE:** 16-5

SHEET 1 OF 1 DATUM: Geodetic BORING DATE: February 24, 2016

LOCATION: N 4860647.72; E 634606.69

HAMMER TYPE: AUTOMATIC

щ		QQ	SOIL PROFILE				SA	MPL	ES	DYNAMIC PEI RESISTANCE	NETRA , BLOV	TION /S/0.3m	)		HYDRAU k	LIC Co , cm/s	ONDUC.	TIVITY,	Т	ی ا	DIE 30:
DEPTH SCALE METRES		BORING METHOD		LOT			œ		.3m		40	60	80 ,		10 <sup>-6</sup>			10-4 1	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	PIEZOMETER OR
Z E E E		ING I	DESCRIPTION	STRATA PLOT	_	EPTH	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRE Cu, kPa	NGTH	nat V.	+ Q- (	•	WAT	ER C		T PERCE		DOTT B. TE	STANDPIPE INSTALLATION
긲		BOR		TRA		(m)	₽	_	BLO		40				Wp I		→W		WI	₹ <u>₹</u>	
	H		GROUND SURFACE	0)	Τ.	186.08				20	40	60	80	+	10	2	:0 :	30	40		
0	r	П	TOPSOIL	EEE		0.00								$\dagger$							Concrete $\sqrt{}$ March 11, 2016
							1	SS	6												March 11, 2016
						185.47															Sand
			(CL-ML) CLAYEY SILT to CLAYEY SILT and SAND, trace to some gravel; brown			0.61	_														l S
1			and SAND, trace to some gravel; brown mottled grey, becoming grey below a depth of 2.3 m, trace fibrous organics; cohesive, w~PL to w>PL, soft to stiff		1		2	SS	12												,
			cohesive, w~PL to w>PL, soft to stiff				-														
						İ															
2							3	SS	13							0					
4						-															
	pr.	ا																			
	AUGE						4	SS	4							0					Bentonite Seal
	WER,	Augers			. (	183.11															
3	) - PO	200 mm O.D. Hollow Stem Augers	(CL) SILTY CLAY, trace sand; light brown; cohesive, w>PL, firm			2.97															
	NTEL	ollow \$	S.S. III				5	SS	6								0				
	Y MOL	).D. H				400.0-	_														
	TRUCK	mm C	(SW) SAND, trace to some gravel, trace		1	182.35 3.73															
4	E-85 1	200	fines; brown; non-cohesive, wet, very loose to dense				6	SS	6												
	CME	5					υ	33	О												高
																					Sand
5							7	SS	4							0				М	
						-															l å
																					Screen
																					   3
6																					
О																					
							8	SS	35							0					
						179.37								_[							
			END OF BOREHOLE			6.71															
7			NOTE:																		
			1. Water level measured in monitoring well at a depth of 0.5 m, February 25,																		
			2016.																		
			2. Water level measured in monitoring well at a depth of 0.11 m, March 11,																		
8			2016.																		
9																					
- 10																					
10																					
	1_			1													I	1	1	1	l
DE	Р	TH S	CALE								A	Gol	der iates							L	OGGED: DM
1:	50	)								V	<b>J</b> A	SSO	iates							CH	ECKED: OS

## RECORD OF BOREHOLE: 16-6

LOCATION: N 4860589.30; E 634092.95

BORING DATE: March 2, 2016

DATUM: Geodetic

HAMMER TYPE: AUTOMATIC

SHEET 1 OF 1

Щ	ДО	SOIL PROFILE			SAM	PLES	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	J DIEZOMETED
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	BLOWS/0.3m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● Cu, kPa rem V. ⊕ U - ○		PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE	0)	186.88	+	+-	20 40 60 80	10 20 30 40	
0	$\Box$	TOPSOIL		0.00 186.68	1	$\top$			Concrete
1		(CL-ML) Gravelly CLAYEY SILT and SAND; brown, trace fibrous organics, oxidation staining; cohesive w>PL to w~PL, soft to very stiff		0.20		S 4		0	March 11, 2016 Bentonite
2		(SM/ML) SILTY SAND to Sandy SILT, some gravel, trace to some cohesive fines; brown, becoming grey below a depth of 3.5 m, oxidation staining; non-cohesive, moist to wet, compact to		185.43	3 S	S 26		0	Sand
	ED - POWER AUGER Stem Augers	dense			4 S	S 39		0	мн
3	UCK MOUNTE				5 S	S 39		0	Screen
4	CME-85 TR				6 S	S 41		0	
5		(ML) Sandy CLAYEY SILT; grey; cohesive, w <pl, (sm="" 3.5="" a="" becoming="" below="" brown,="" cohesive="" depth="" fines;="" gravel,="" grey="" hard="" m,="" ml)="" non-cohesive,<="" of="" oxidation="" sand="" sandy="" silt,="" silty="" some="" staining;="" td="" to="" trace=""><td></td><td>182.00</td><td>7A S</td><td>S 38</td><td></td><td></td><td>Cave</td></pl,>		182.00	7A S	S 38			Cave
6		moist to wet, dense to very dense		1	8 S	88/ 0.28		0	
7		END OF BOREHOLE  NOTE:  1. Water level measured in open borehole at a depth of 0.9 m upon completion of drilling, March 2, 2016		6.53					
8		Water level measured in monitoring well at a depth of 0.42 m, March 11, 2016.							
9									
10									
DE	PTH	SCALE	1				Golder Associates		LOGGED: DM

## 16-7 **RECORD OF BOREHOLE:**

SHEET 1 OF 1 DATUM: Geodetic BORING DATE: February 29, 2016

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

LOCATION: N 4860439.38; E 633967.65

HAMMER TYPE: AUTOMATIC

SALE		тнор	SOIL PROFILE	T.			MPL	-	DYNAMIC F RESISTANO	CE, BLO	WS/0	.3m	,	HYDR	AULIC k, cn	CONI 1/s 10 <sup>-5</sup>			0-3	ING ING	PIEZOMETER
DEPTH SCALE METRES		BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 SHEAR STI Cu, kPa		re	nt V. + m V. ⊕	U- O	w w	/ATER	CON	⊖ <mark>W</mark>	PERCE	NT WI	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	T	-	GROUND SURFACE	S	187.59			ш	20	40	60		30	<u> </u>	10	20	30	) 4	10		
0		Т	TOPSOIL		0.00																Concrete
					187.18		SS	4													
			(CL-ML) Sandy CLAYEY SILT, trace gravel; brown, trace fibrous organics;		0.41																
			cohesive, w <pl soft="" stiff<="" td="" to="" very="" w~pl,=""><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Bentonite</td></pl>				1														Bentonite
1						2	SS	12													
																					Sand >
						$\vdash$	-														Sund
						3	SS	19													Í
2																					
			(ML-CL) Sandy CLAYEY SILT to Sandy		185.38 2.21		1														
	GER		SILTY CLAY, trace to some gravel; light brown, oxidation staining (TILL);			4	00							,	ļ					A1 /A41 ·	
	ER AUC	3rs	cohesive, w <pl, hard<="" td=""><td></td><td></td><td>4</td><td>SS</td><td>41</td><td></td><td></td><td></td><td></td><td></td><td>  '</td><td>Ĭ</td><td>1</td><td></td><td></td><td></td><td>AL/MH</td><td> </td></pl,>			4	SS	41						'	Ĭ	1				AL/MH	
3	POWE	n Auge																			March 11, 2016
	TED.	Solid Stem Augers																			
	NON	O.D. Sol	(SW) Gravelly SAND, some fines;		184.08 3.51		SS	41						'	1						
	CME-85 TRUCK MOUNTED - POWER AUGER	mm O	brown; non-cohesive, moist, dense		3.66																
4	-85 TF	100	(ML/CL) Sandy CLAYEY SILT to SILTY CLAY, trace to some gravel; grey, oxidation staining (TILL); cohesive,																		Į.
	CME		w <pl stiff="" stiff<="" td="" to="" very="" w~pl,=""><td></td><td></td><td>6</td><td>SS</td><td>14</td><td></td><td></td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td></pl>			6	SS	14							0						
							1														
5						7	SS	17							0						
																					Cave
6																					
						8	SS	22						(	<b>→</b>						
	H	Н	END OF BOREHOLE	#J	180.88 6.71						$\dashv$					+	$\dashv$				
7			NOTE:																		
			Water level measured in open																		
			borehole at a depth of 4.3 m upon completion of drilling, February 29, 2016.																		
			2. Water level measured in monitoring well at a depth of 2.78 m, March 11,																		
8			well at a depth of 2.78 m, March 11, 2016.																		
9																					
10																					
DE	ΕPT	TH S	CALE							7		.11								L	OGGED: DM
	50								(	<b>1</b>	ŢĠ	olde	er ates								ECKED: OS

## **RECORD OF BOREHOLE:** 16-8

BORING DATE: February 29, 2016

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 4860234.20; E 634189.57

HAMMER TYPE: AUTOMATIC

щ	QO	SOIL PROFILE			] ;	SAM	PLES	DYNA RESIS	MIC PEI	NETRA	TION /S/0.3m	)	HYDF	RAULIC ( k, cm.	CONDUC /s	TIVITY,	T	٥١_ ا	DIEZONETES
DEPTH SCALE METRES	BORING METHOD		LOT			r	3m			40	60	80 `				0-4	10-3	ADDITIONAL LAB. TESTING	PIEZOMETER OR
MET	ING P	DESCRIPTION	STRATA PLOT	DEP	— I 2		BLOWS/0.3m	SHEA Cu kF	R STRE	NGTH	nat V.	+ Q - ● ⊕ U - ○	V		CONTEN.			DOTT.	STANDPIPE INSTALLATION
7	BOR		STRA	(m	1)	¥   ¹	BLO	,		40	60	80	W	/p	⊖W 20		WI 40	44	
		GROUND SURFACE	3,	18	3.22		+	† **	20	+0	60	ου		10	20	30	40		
0		TOPSOIL	EEE		0.00														Concrete
		(CL-ML) Sandy CLAYEY SILT, trace			2.97 0.25	1 S	S 12												
		gravel; light brown to brown, oxidation staining; cohesive, w~PL to w>PL, stiff																	abla
		to very stiff			$\vdash$														March 11, 2016
1						2 8	S 13								0				
					E														Bentonite
2				1	;	3 S	S 22								0				
2				18	1.01	_													
	~	(SM/ML) SILTY SAND to Sandy SILT, some gravel, some cohesive fines; grey (TILL); non-cohesive, moist, compact to	2 4 4 4 4	:	2.21														
	NGE	(TILL); non-cohesive, moist, compact to very dense	4		.	4 S	S 24						0						
	VER A																		Sand
3	- PO\ em Au		4		$\vdash$														
	CME-85 TRUCK MOUNTED - POWER AUGER 100 mm O.D. Solid Stem Augers		4			5 S	S 33							0					
	S .O.C		7																
	RUCK				F														
4	100 100																		
	CME				- [ '	6 S	S 64							3				MH	
					H														
																			Screen
5			4			7 S	S 52												
-			40		-														
			4																
			4 4																
			4																
6				. 1 r1	H														
					- [,	B S	S 63							0					Sand
			4 4 4	170	6.51														[3
		END OF BOREHOLE	1114		6.71			1											I's.
7		NOTE:						1											
		Water level measured in open borehole at a depth of 6.0 m upon drilling	.					1											
		completion, February 29, 2016.	<b>'</b>					1											
		Water level measured in monitoring well at a depth of 0.64 m, March 11,						1											
8		well at a depth of 0.64 m, March 11, 2016.						1											
								1											
								1											
								1											
9								1											
9								1											
								1											
10																			
								1		<u> </u>						<u> </u>			
DE	PTH S	SCALE								X	Cal	lan						L	OGGED: DM
1:	50								V		)IUD Vass	ler iates						CH	IECKED: OS

GTA-BHS 001

1:50

### **RECORD OF BOREHOLE:** 16-9

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 4859910.90; E 634082.19

BORING DATE: February 29, 2016

CHECKED: OS

HAMMER TYPE: AUTOMATIC SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL -AB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wn F - wi (m) GROUND SURFACE 183.30 TOPSOIL 0.00 Concrete 183.00 SS 9 (CL-ML) Sandy CLAYEY SILT; brown, 0.30 1B 0 some fibrous organics; cohesive, w~PL, 182.61 (CL) SILTY CLAY, sandy to trace sand, varved; brown to light brown, becoming grey below a depth of 1.8 m; cohesive, w~PL to w<PL, firm to very stiff March 11, 2016 2 SS 5 0 SS 21 2 CME-85 TRUCK MOUNTED - POWER AUGER 0 SS 15 Screen SS 21 5 0 S:CLIENTSIRUNNYMEDEIYORK DOWN GOLF COURSE\02 DATA\GINT\1413472 FROM RUNNYMEDE.GPJ GAL-MIS.GDT 4/18/16 179.57 100 mm (CI) SILTY CLAY, trace sand; grey; cohesive, w~PL, very stiff to hard SS 19 0 Sand SS 40 Bentonite SS 43 176.59 6.71 END OF BOREHOLE NOTE: 1. Borehole dry upon completion of drilling, February 29, 2016. 2. Water level measured in monitoring well at a depth of 0.86 m, March 11, 2016. 9 10 DEPTH SCALE LOGGED: DM Golder

## **RECORD OF BOREHOLE:** 16-10

DATUM: Geodetic BORING DATE: February 29, 2016

LOCATION: N 4859988.01; E 633603.68

HAMMER TYPE: AUTOMATIC

SHEET 1 OF 1

щ	QQ	SOIL PROFILE			S	AMPL	ES	DYNAMIC PENETRA RESISTANCE, BLO	ATION NS/0.3m	)	HYDRAULIC CONDUCTIV k, cm/s	ITY, T	ا ت	DIEZOMETES
DEPIN SCALE METRES	BORING METHOD		LOT		2		.3m	20 40		30 `	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup>	10-3	ADDITIONAL LAB. TESTING	PIEZOMETER OR
MET	ING	DESCRIPTION	STRATA PLOT	DEPT	—I ≡	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat V. + rem V. ⊕	Q - •	WATER CONTENT P	ERCENT	DDIT B. TE	STANDPIPE INSTALLATION
7	BOR		STRA	(m)	`' ⊇		BLO				Wp		₹≤	
		GROUND SURFACE	0)	190.	-	+		20 40	60 8	30	10 20 30	40		
0	П	TOPSOIL	EEE	0.	00									Concrete
		(CL-ML) Sandy CLAYEY SILT, trace	- 17T	190. 0.		SS	6							<u>∑</u> March 11, 2016
		gravel; light brown; cohesive, w~PL, firm to very stiff		1										Warch 11, 2010
				1										
1				1										
				1	2	SS	7							
				1										Bentonite
				1	$\vdash$									Bentonite
				1	3	ss	19				0			
2				1										
		(ML) Sandy SILT to SILT and SAND,		188.		1								
	SER	same arough trace to same schooling												
	R AUC	non-cohesive, moist, compact			4	SS	23							123
3	5 TRUCK MOUNTED - POWER AUGER	COM CILTY CAND (COM	44			+								Sand S
J	ED - P	(SM) SILTY SAND, trace gravel; brown; non-cohesive, wet, very dense		187.	16 5A		50/ 0.13							
	UNTE	(ML) Sandy SILT to SILT and SAND, some gravel, trace to some cohesive.	4 4 4 4 4	3.	20 5E	+	0.13							
	X MC	some gravel, trace to some cohesive, fines; brown, becoming grey below a depth of 4.1 m, oxidation staining (TILL);		1										
	TRUC	non-cohesive, moist, compact to very dense			$\vdash$	+								
4	CME-85	2 uchac		1	6	SS	40						МН	[3]
	CIN			1	"	33	40						ivii 1	
				1		1								Screen
														Screen
5					7	SS	28							
5						4								
		- Auger grinding on probable cobbles and boulders at a depth of about 5.5 m	404	1										
				1										
6			40			1								
			9,0	1										
					8	SS	51							Sand
		END OF BOREHOLE	14	183. 6.			$\vdash$							
7		NOTE:												
		Water level measured in open												
		borehole at a depth of 2.0 m upon drilling completion, February 29, 2016.												
		1												
		2. Water level measured in monitoring well at a depth of 0.27 m, March 11,												
8		2016.												
9														
. 40														
10														
		1		<u> </u>										I .
DE	PTH	SCALE							Golda	710			L	OGGED: DM
1:	50							<b>T</b>	Golde Associa	ates			СН	IECKED: OS

GTA-BHS 001

1:50

### RECORD OF BOREHOLE: 16-11

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 4859797.82; E 634643.69

BORING DATE: February 25, 2016

CHECKED: OS

HAMMER TYPE: AUTOMATIC SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL -AB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 OR BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp F - wi (m) GROUND SURFACE 181.20 TOPSOIL 0.00 Concrete (CL-ML) Sandy CLAYEY SILT; light SS 6 brown, mottled grey, trace fibrous organics; cohesive, w>PL, firm to stiff 2 SS 13 0 179.75 (CL-ML) CLAYEY SILT, some sand: brown to grey; cohesive, w<PL, stiff SS 15 0 - 80 mm sand seam at a depth of 1.8 m CME-85 TRUCK MOUNTED - POWER AUGER 0 SS 13 SS 5 10 March 11, 2016 S:CLIENTSIRUNNYMEDEIYORK DOWN GOLF COURSE\02 DATA\GINT\1413472 FROM RUNNYMEDE.GPJ GAL-MIS.GDT 4/18/16 177.47 100 mm (SM) SILTY SAND, gravelly to some gravel, trace to some cohesive fines; grey, contains crushed rock fragments (TILL); non-cohesive, moist, compact to SS 30 0 SS 43 0 МН Screen SS 0 36 Sand 174.49 6.71 END OF BOREHOLE NOTE: 1. Water level measured in monitoring well at a depth of 3.33 m, March 11, 2016. 9 10 DEPTH SCALE LOGGED: DM Golder

## RECORD OF BOREHOLE: 16-12

BORING DATE: February 25, 2016 DATUM: Geodetic

LOCATION: N 4860771.27; E 634894.00

HAMMER TYPE: AUTOMATIC

SHEET 1 OF 3

щ	QQ	SOIL PROFILE		. :	SAMF	LES	DYNAMIC PENETRATION \ RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	T J S DIEZOMETED
DEPIH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	TYPE	BLOWS/0.3m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup>	PIEZOMETER OR STANDPIPE INSTALLATION
	Δ	GROUND SURFACE	ST	` /	+	- m	20 40 60 80	10 20 30 40	
0	$\neg$	TOPSOIL	EEE	190.11	+				B #
		(SM/ML) SAND and SILT to Sandy SILT, some gravel, trace to some cohesive fines; grey (TILL); non-cohesive, moist, dense to very dense		189.88 0.23	1 85	6 4			
1		- Auger grinding on probable cobbles/boulders at a depth of 1.2 m	7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		2 85	S 45		0	Σ
2			A A A A A A A A A A A A A A A A A A A		3   85	6 48		0	
			2 4 2 4 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		4 SS	6 49		•	
3			4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		5 88	32		0	
4	WGER		A & A & A & A & A & A & A & A & A & A &		6 SS	38		0	
	VTED - POWER / Iow Stem Augers		A A A A A A A A A A A A A A A A A A A		7 SS	S 40		0	
5	CME-85 TRUCK MOUNTED - POWER AUGER 200 mm O.D. Hollow Stem Augers		7 4 7 4 7 4 7 4 7 4 7 4 7						
7			A 4 2 4 4 2 4 4 2 4 4 4 4 4 4 4 4 4 4 4		8 S8	35		0	
8			4 7 4 7 4 7 4 7 4 7 4 7 4 7 4 7 4 7 4 7	,	9 SS	8 46		0	
- 9			7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1	0 SS	63		0	
10		CONTINUED NEXT PAGE	ngd (c						
	PTH S 50	SCALE					Golder Associates		LOGGED: DM CHECKED: OS

## **RECORD OF BOREHOLE:** 16-12

SHEET 2 OF 3 LOCATION: N 4860771.27; E 634894.00 DATUM: Geodetic BORING DATE: February 25, 2016

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

±   ړږ	SOIL PROFILE	1.		SA	MPL	-	DYNAMIC PENETRA RESISTANCE, BLOV	TION VS/0.3m	HYDRAULIC (	/s	7  49	PIEZOMETER
METRES BORING METHOD		STRATA PLOT	ELEV.	ËR	ш	BLOWS/0.3m	20 40	60 80		10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup>	E	OR STANDPIPE
ME ME	DESCRIPTION	ATA	DEPTH	-1 =	TYPE	/SMC	SHEAR STRENGTH Cu, kPa	nat V. + Q - ■ rem V. ⊕ U - C		CONTENT PERCENT	ABDIT	INSTALLATION
8		STR	(m)	z		BL(	20 40	60 80		20 30 40		
10	CONTINUED FROM PREVIOUS PAGE											153
11	(CI) SILTY CLAY, trace to some sand, varved; grey; cohesive, w>PL, stiff to hard	4 7 8	179.9i	1	SS	37				0		
12				12	ss	45				0		
CME-85 TRUCK MOUNTED - POWER AUGER 200 mm O.D. Hollow Stem Augers				13	ss	27				0		
200 mm O.				14	ss	12				0		Bentonite Seal
17	- 50 mm sand seam at a depth of 16.9 m			15	ss	32			<sub> </sub>	0-1	MH/AL	
18				16	ss	22				0		Silica Sand Filter
19	END OF BOREHOLE  NOTE:  1. Water level measured in monitoring well A at a depth of -0.70 m (above ground surface), March 11, 2016.  2. Water level measured in monitoring  CONTINUED NEXT PAGE		171.2 18.9	1								

## **RECORD OF BOREHOLE:** 16-12

SHEET 3 OF 3 DATUM: Geodetic BORING DATE: February 25, 2016

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

LOCATION: N 4860771.27; E 634894.00

HAMMER TYPE: AUTOMATIC

ا ٿِ	임	SOIL PROFILE	1.		SA	MPLI		DYNAMIC F RESISTAN	CE, BLOV	/S/0.3m		HYDRAU k	, cm/s	IVIIT,	Ţ	ودِ	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD		STRATA PLOT	ELEV.	Ë		BLOWS/0.3m	20	40		80 )	10-6			0-3 1	ADDITIONAL LAB. TESTING	OR STANDPIPE
AR	RING	DESCRIPTION	₹ATA	DEPTH	NUMBER	TYPE	/SMO	SHEAR ST Cu, kPa	RENGTH	nat V. ∃ rem V. €	Q - Q Q - Q		ER CO			ADDI:	INSTALLATION
ت ا	B0		STR	(m)			BĽ	20	40	60	80	10			10		
- 20		CONTINUED FROM PREVIOUS PAGE														$\Box$	
		well B at a depth of 0.41 m, March 11, 2016.															
- 21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
20																	
29																	
- 30																	
		•	-		•			1			1						
DEF	PTH S	SCALE							PA :	Gold ssoci	er					LC	OGGED: DM
1:5	50							•	JJA	SSOCi	ates					CHE	ECKED: OS

## **RECORD OF BOREHOLE:** 16-13

SHEET 1 OF 2

LOCATION: N 4860121.00; E 635100.28

BORING DATE: February 22, 2016

DATUM: Geodetic

_ ا	ДОР	SOIL PROFILE			SA	MPLE	ES	DYNAMIC PENETRATION \ RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	ا ي ا ي	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● Cu, kPa rem V. ⊕ U - ○	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> WATER CONTENT PERCENT  Wp	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
_		GROUND SURFACE	S	184.14			_	20 40 60 80	10 20 30 40		В
0		TOPSOIL (CL-ML) Sandy SILTY CLAY to CLAYEY SILT, trace gravel; brown to brown mottled grey, fibrous organics, oxidation staining; cohesive, w~PL, firm to very stiff		0.00 0.08	1A 1B	l l	6		0		
1					2	SS	16		0		
2		(SP) SAND, trace fines; grey;		181.93 2.21	3	SS	21		0		$ar{\Sigma}$
3		(ML/SM) Sandy SILT to SILTY SAND, gravelly to some gravel, trace to some cohesive fines; grey (TILL); non-cohesive, moist to wet, compact	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	181.55 2.59	4A 4B	SS	15				
			4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		5	SS	22		0		
4	AUGER	- Auger grinding on probable cobbles/boulders at a depth of 3.8 m	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		6	ss	18		0		
5	CME-85 TRUCK MOUNTED - POWER AUGER 110 mm I.D. 200 mm O.D. Hollow Stem Augers	- Auger grinding on probable cobbles/boulders at a depth of 4.6 m	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		7	SS	22		0	МН	
6	CME-85 TF 110 mm I.D	(SM) SILTY SAND; grey; non-cohesive, wet, compact	4 4 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	177.89 6.25	8A 8B	ss	17		0		
7		(SM) SILTY SAND, trace to some gravel, trace cohesive fines; grey (TILL); moist to wet, compact to dense - Auger grinding on probable cobbles/boulders from depths of 6.9 m to 7.5 m	1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	177.49 6.65	8C						
8			ANANANA		9	ss	32		0		
9		(ML) Sandy SILT; grey; non-cohesive, wet, loose		175.45 8.69	10A	ss	9		0		
10		CONTINUED NEXT PAGE			10B		_		0		

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### RECORD OF BOREHOLE: 16-13

SHEET 2 OF 2

LOCATION: N 4860121.00; E 635100.28

BORING DATE: February 22, 2016

DATUM: Geodetic

CHECKED: OS

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm HAMMER TYPE: AUTOMATIC DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL -AB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 OR NUMBER SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ STANDPIPE ELEV. TYPE BLOWS/0 WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wn F - wi (m) --- CONTINUED FROM PREVIOUS PAGE --10 173.93 (SM) SILTY SAND trace to some gravel, 10.21 trace cohesive fines; grey (TILL); non-cohesive, moist, dense 11 SS 38 C (SM) SILTY SAND, some gravel; grey; non-cohesive, wet, loose 12 SS 12 5 CME-85 TRUCK MOUNTED - POWER AUGER 170.88 (SW) SAND, trace gravel; grey; non-cohesive, wet, very dense DATA\GINT\1413472\_FROM\_RUNNYMEDE.GPJ GAL-MIS.GDT 4/18/16 - Auger grinding on probable cobbles/boulders at a depth of 13.6 m SS 56 0 Bentonite Seal 169.81 (ML) Sandy SILT to SILT and SAND; 14.33 grey; non-cohesive, moist to wet, very dense Sand 15 SS 14 80 16 Silica Sand Filter 94/ 0.28 0 SS 17 15 Sand S:\CLIENTS\RUNNYMEDE\YORK\_DOWN\_GOLF\_COURSE\02\_ END OF BOREHOLE NOTE: 1. Water level measured in hollow stems at a depth of 3.9 m after advance augers to a depth of 3.8 m. 18 2. Water level measured in open borehole at a depth of 7.5 m upon completion of drilling, February 22, 2016. 3. Water level measured in monitoring well A at a depth of 0.96 m, March 11, 19 4. Water level measured in monitoring well B at a depth of 1.91 m, March 11, 20 DEPTH SCALE LOGGED: DM Golder

## **RECORD OF BOREHOLE:** 16-14

SHEET 1 OF 2 DATUM: Geodetic

LOCATION: N 4859941.64; E 634905.52

BORING DATE: February 26, 2016

HAMMER TYPE: AUTOMATIC

<del>-</del>	700	PT HAMMER: MASS, 64kg; DROP, 760mm										HAMMER	TYPE: AUTOMATIC
	우	SOIL PROFILE			SA	MPL	ES	DYNAMIC PENETRATION RESISTANCE, BLOWS/0	.3m	HYDRA	AULIC CONDUCTIVITY, k, cm/s	T _9	PIEZOMETER
METRES	BORING METHOD		LOT		<u>س</u>		.3m	20 40 60	80 `	10	0 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 1	ADDITIONAL AB TESTING	OR OR
WET I	9	DESCRIPTION	'A PI	ELEV.	ABE!	TYPE	/S/0.	SHEAR STRENGTH na	t V. + Q - ●	W	ATER CONTENT PERCE	NT E	STANDPIPE INSTALLATION
_	ORII		STRATA PLOT	DEPTH (m)	NUMBER	F	BLOWS/0.3m	Cu, kPa rei	m V. ⊕ U - ○	Wp	→ <del> </del>	wı 📴	11017.EEA11011
_	á		ST	()	_		ā	20 40 60	80	1	0 20 30 4	10	
0	_	GROUND SURFACE		177.45									B A
		TOPSOIL		0.00 177.15	1A								
		(SM) SILTY SAND, some gravel, trace		0.30	45	SS	7						
		cohesive fines; brown to light brown, fibrous organics, oxidation staining;		176.76	1B								
		non-cohesive, moist, loose		0.69	<u> </u>								
1		(SM) SILTY SAND, some gravel, trace cohesive fines; light brown to brown,											
		becoming grey below a depth of 2.3 m,	<b>∀ A</b>		2	SS	15			0			
		oxidation staining (TILL); non-cohesive, moist, compact to dense	444	1									
		- Auger grinding on probable cobbles/boulders at a depth of 1.4 m											
					,	00	20			_			
2					3	SS	38			0			
-		- Auger grinding on probable cobbles/boulders at a depth of 2.0 m			$\vdash$								
		· ·		1									
				1	4	SS	40			0			
			4	1									
3													
			8 4										
			4		5	ss	27			0			
					L								
			4 4	1									
4	_		7 4										
	JGEF				6	SS	24			0			
	ER AL			172.95									
	CME-85 TRUCK MOUNTED - POWER AUGER	(SM/SW) SILTY SAND to SAND, trace to some gravel, trace clay; grey;		4.50									
		non-cohesive, wet, loose to compact		1	7	SS	19					МН	.  📕 🗒
5				1									
	X   K												
	E-85			1									
	S S			1									
6				1									
					8	SS	8				0		
				1									
7				1									
					$\vdash$								
				1	9	SS	14						
8				1									
<u> </u>				1									
9				1									
				1									
					10	SS	31				9		
10	_L			1	L.					L	L _	_	_  🌡
١٠		CONTINUED NEXT PAGE											
			1	1	-				ı		1 1		1
		SCALE						<b>( )</b> G	older ociates				LOGGED: DM
	50							Ass	ociates			C	HECKED: OS

# **RECORD OF BOREHOLE: 16-14**

LOCATION: N 4859941.64; E 634905.52 BORING DATE: February 26, 2016 DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

SHEET 2 OF 2

Ш	무	SOIL PRO				SA	MPLI	ES	DYNAM RESIST	TANCE,	BLOW	5/0.3m	)	HYDR	AULIC ( k, cm	CONDUC s	IIVIIY,	Ţ	ود	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD			STRATA PLOT	EL E.,	띪		J.3m	20		40	60	80 '					10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
쥬	₹ING	DESCRIPTION		ATA!	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	SHEAR Cu, kPa		NGTH	nat V. rem V.	+ Q - ● ⊕ U - ○			CONTEN			AB. TI	INSTALLATION
ă	BOF			STR,	(m)	ž		BLC	20		40	60	80		p	W 20		WI 40	4 5	
		CONTINUED FROM PREVIO						$\dashv$	20			Ť		<u> </u>		Ī		Ť	1 1	
10		(SM/SW) SILTY SAND to SA	ND, trace					1												×
		to some gravel, trace clay; gr non-cohesive, wet, loose to c	compact																	
- 11						11	SS	29							<b>→</b>					
	띪	(CL-ML) Sandy CLAYEY SIL	T trace		165.72 11.73															
12	R AUG	(CL-ML) Sandy CLAYEY SIL' gravel; grey (TILL); cohesive, hard	, w <pl,< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,<>																	
	NO (	A S	7																	
	<u>-</u>	90	P  			12	ss	92/ 0.25							<b>)</b>					$\aleph$
	NNO I		7					J.2J												
13	Z   S	Ē	<i>i</i> ∤ ≯																	
10	5 TRL		<b>!</b>																	×
	CME-85 TRUCK MOUNTED - POWER AUGER	(CL-ML) Sandy CLAYEY SIL gravel; grey (TILL); cohesive, hard	, S																	
	]		, ,																	
						40														
14						13	SS	69						'	Ο					
					ŀ															
			7																	20
																				ă
15																				Ŕ
	T	7	7			14	SS	50/ 0.08							}					
		<u></u>																		
16	TRICONE	namer Namer	<b>*</b>																	
	TRIO.	ou mm Liamees																		
			*																	
								05,												
17			*		160.25	15	SS	95/ 0.28							0					
		END OF BOREHOLE:			17.20			$\exists$												
		NOTE:																		
		Water level measured in m well A at a depth of 1.67 m, N	nonitoring March 11,																	
- 18		2016.																		
		3. Water level measured in m well B at a depth of 1.99 m, N	nonitoring March 11,																	
		2016.																		
- 19																				
- 20																				
																	<u> </u>			
DE	PTH	SCALE										O -1 1	است						LC	OGGED: DM
	50									J		010 010	er iates							ECKED: OS

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## RECORD OF BOREHOLE: 16-15

SHEET 1 OF 2 DATUM: Geodetic

LOCATION: N 4859619.51; E 634368.01

BORING DATE: March 4, 2016

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm HAMMER TYPE: AUTOMATIC DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 50 mm DIAMETER MONITORING WELL WITH ABOVE ATION BLOWS/0.3m NUMBER ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wn F GROUND STEEL CASING (m) GROUND SURFACE 180.87 TOPSOIL 0.00 (CL-ML) CLAYEY SILT, trace to some 0.15 SS 0 sand; grey, oxidation staining; cohesive, w<PL to w~PL, firm to stiff SS 10 2 3 SS 12 0 (CL-ML) SILTY CLAY, trace sand, trace gravel; grey; cohesive, w>PL, stiff to very soft 0 SS 11 5 SS 5 0 S:CLIENTSIRUNNYMEDEIYORK DOWN GOLF COURSE\02 DATA\GINT\1413472 FROM RUNNYMEDE.GPJ GAL-MIS.GDT 4/18/16 CME-85 TRUCK MOUNTED - POWER AUGER SS wн 0 O.D. Hollow Stem Augers 175.99 SS 6 (SM/SW) SAND and SILT to SAND, 7R 0 some gravel; grey; non-cohesive, wet, loose to compact 200 - Auger grinding on probable cobbles/boulders at a depth of 6.1 m SS 10 174.39 (SM) SILTY SAND, trace to some 8B 0 gravel, some cohesive fines; grey; non-cohesive, wet, compact to dense 9 SS 38 0 - 150 mm sand and silt seam at a depth of 8.1 m 172.18 (ML-CL) Sandy CLAYEY SILT, trace gravel; grey (TILL); cohesive, w<PL, hard 92/ 0.28 10 SS CONTINUED NEXT PAGE DEPTH SCALE LOGGED: DM Golder 1:50 CHECKED: OS

**RECORD OF BOREHOLE: 16-15** 

SHEET 2 OF 2

DATUM: Geodetic

LOCATION: N 4859619.51; E 634368.01

BORING DATE: March 4, 2016

HAMMER TYPE: AUTOMATIC

щ	ДОР	SOIL PROFILE			SAM	IPLES	DYNAMIC PENETRATION \ RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	ق ٦	DIEZOMETED
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE BLOWS/0.3m	1	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> WATER CONTENT PERCENT  Wp	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
- 10		CONTINUED FROM PREVIOUS PAGE					20 40 00 00	10 20 30 40		
- 11		(ML-CL) Sandy CLAYEY SILT, trace gravel; grey (TILL); cohesive, w <pl, hard</pl, 		-	11 8	SS 41		•		
12		(SM) Gravelly SILTY SAND, some cohesive fines; grey; non-cohesive, wet, compact		169.14 3 11.73						Bentonite Seal
					12 \$	SS 28		0		, X
- 13	R AUGER									Sand
14	CME-85 TRUCK MOUNTED - POWER AUGER 200 mm O.D. Hollow Stem Augers				13 \$	SS 31			МН	Silica Sand Filter
15	CME-85 TRUC	(SM) SILTY SAND, some gravel, trace cohesive fines; grey (TILL); non-cohesive, moist to wet, very dense		166.09	14 5	SS 50 0.0	/ 5	0		Bentonite Seal
16			4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		15 \$	SS 50 0.0	/ 8			Cave
18		END OF BOREHOLE	7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8	162.43 18.44	16 \$	SS 50 0.1	,	0		
19		NOTE:  1. Water level measured in monitoring well A at a depth of 4.11 m, March 11, 2016.  2. Water level measured in monitoring								
20		well B at a depth of 3.24 m, March 11, 2016.								
DE	PTH S	CALE					Golder		L	OGGED: DM

## **RECORD OF BOREHOLE:** 16-16

LOCATION: N 4860097.78; E 634583.69 DATUM: Geodetic BORING DATE: February 22, 2016

SHEET 1 OF 2

ا ب	阜	SOIL PROFILE			SA	MPLE	S RE	SISTANG	PENETRA CE, BLOV	VS/0.3m		HYDRA	k, cm	COND /s	UCTIVIT	ΙΥ,	ي∟ ⊺	DIEZONET	ren
METRES	BORING METHOD		LOT		œ			20	40	60	80	10		10-5	10-4	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	PIEZOMET OR	
MET I	NG.	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	EAR STF , kPa	RENGTH	nat V.	+ Q - ● ⊕ U - ○					RCENT	DOTE B. TE	STANDPIF INSTALLAT	
7	BOR		ĭTRA	(m)	₽	-			40			Wp			W	<b>—</b>   WI	[\$\f\]		
$\dashv$	$\exists$	GROUND SURFACE	S	179.60		-	+	20	40	60	80	10	U	20	30	40	+	<u> </u>	<u>z</u>
0	$\top$	TOPSOIL	EEE	0.00 179.40	1A													March 11, 2016	1
		FILL - (CL) Sandy SILTY CLAY, some		0.20		ss	8												Š
		gravel; dark brown to brown; cohesive, w <pl, firm<="" soft="" td="" to=""><td></td><td></td><td>1B</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>(</td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>			1B								(						
																		Sand	
1																			4
İ					2	SS	4								0				
			$\longrightarrow$	178.15															ı
		(OL) ORGANIC SILT, some sand; black		1.45														Bentonite	ı
					ЗА	ss	13											Bernorine	ı
2		(SW) SAND and GRAVEL, trace fines,	H#E	177.57 17 <del>7</del> .38	3B								)						
		trace gravel; brown; non-cohesive, moist, compact	ДŢ	2.21															
		(SM) SILTY SAND; grey; non-cohesive, wet, loose to compact	11		4	SS 2	24												
		wet, loose to compact	17.		*	00	-7												
3																			
				]	5	ss	6							þ					
				]															
4	띪	- 80 mm thick gravelly sand seam noted at a depth of 4.0 m		]	6	ss	6							<b>\rightarrow</b>					
	R AUC			175.10															
	OWE	(SW) SAND, trace silt, trace gravel; grey; non-cohesive, wet, compact	147	4.50	7A								0						
	ED - P	grey; non-cohesive, wet, compact				ss	19												
5	Holloy Tolloy				7B								(	)					
	8   o   o   o   o																		
5	85 TRUCK MOUNTED - POWER A 200 mm O.D. Hollow Stem Augers			173.96															
	ME-86	(SM/ML) SAND and SILT to Sandy SILT,	4 4 4 4	5.64															
6	<sup>0</sup>	trace gravel, trace to some cohesive fines; grey (TILL); non-cohesive, wet to																	
		moist, very dense	9 4															Cave	
					8	SS	53						0						
				]															
7																			
				]															
			4	]															
			4	]	9	SS 1	00						)						
8				] ]															
			40																
			4 4																
9																			
				]															
					10	ss	76						0						
10			عان اعلا إ	†			_ -	- † -		- †				†-		- † - ·	_		_KX_
			1									I .						I	
DEF	TH S	SCALE								Gold Ssoc							1.0	OGGED: DM	

GTA-BHS 001

1:50

### RECORD OF BOREHOLE: 16-16

SHEET 2 OF 2 DATUM: Geodetic

LOCATION: N 4860097.78; E 634583.69

BORING DATE: February 22, 2016

CHECKED: OS

HAMMER TYPE: AUTOMATIC SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm HYDRAULIC CONDUCTIVITY, k, cm/s DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 BLOWS/0.3m NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH <u>-</u>₩ - WI Wn F (m) --- CONTINUED FROM PREVIOUS PAGE ---- Auger grinding on probable 169.39 cobbles/boulders at a depth of 9.9 m and at a depth of 10.2 m Bentonite CME-85 TRUCK MOUNTED - POWER AUGER 10.21 (SM/GW) SILTY SAND to Sandy GRAVEL, some fines; grey; Sand non-cohesive, wet, compact to very dense SS 16 0 Screen 12 167.26 12 SS 50 12.34 0 Sand - Auger grinding on probable cobbles/boulders at a depth of 12.3 m END OF BOREHOLE: 13 1. Water level measured in hollow stem augers at a depth of 3.10 m after advancing to a depth of 3.8 m. S:CLIENTS!RUNNYMEDE!YORK\_DOWN\_GOLF\_COURSE!02\_DATA\GINT\1413472\_FROM\_RUNNYMEDE.GPJ\_GAL-MIS.GDT\_4/18/16 2. Water level measured monitoring well at a depth of -0.12 m (above ground surface), March 11, 2016. 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: DM Golder

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

1:50

### **RECORD OF BOREHOLE:** 17-1

SHEET 1 OF 2

CHECKED: SEMP

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 16, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 20 GROUND SURFACE 181.56 TOPSOIL 181.32 0.24 (SC) CLAYEY SAND, trace gravel; dark 1 SS 10 brown, organic matter, rootlets; non-cohesive, moist, loose 2 SS 6 0 (SP/GP) SAND and GRAVEL, trace silt; brown to grey; non-cohesive, wet, loose to compact SS 5 0 16-MAR-17 0 4A (CL-ML) SILTY CLAY to CLAYEY SILT, SS 14 4B 0 trace sand, trace gravel; grey, (TILL); cohesive, w~PL to w<PL, stiff to hard 5 SS 17 0 o CME 55 Trackmount Power Auger 108 mm I.D H∧ll∞... ∩ SS 6 38 SS 78 8 SS 50/ 0.13 (SM) SILTY SAND; grey; non-cohesive, wet, very dense 9 172.22 9.35 ss 50/ 0.08 (CL-ML) SILTY CLAY to CLAYEY SILT, trace sand, trace gravel; grey, (TILL); 9B 0 cohesive, w<PL, hard CONTINUED NEXT PAGE DEPTH SCALE LOGGED: PT

Golder

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-1

BORING DATE: March 16, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES 10-4 STRATA PLOT 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH OW. Wp **I** (m) 60 20 --- CONTINUED FROM PREVIOUS PAGE ---10 (CL-ML) SILTY CLAY to CLAYEY SILT, trace sand, trace gravel; grey, (TILL); cohesive, w<PL, hard GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JULTB 170.76 10 SS 50/ 10.81 SS 0.13 END OF BOREHOLE 11 Notes: 1. Groundwater encountered during drilling at a depth of 1.5 m below ground surface. 2. Borehole open upon completion of 12 drilling. 3. Groundwater measured at a depth of 1.89 m below ground surface upon completion of drilling. 13 14 15 16 17 18 19 20 DEPTH SCALE

1:50

### **RECORD OF BOREHOLE:** 17-2

SHEET 1 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 16, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) GROUND SURFACE 180.53 0.00 180.32 0.21 TOPSOIL (CL) sandy SILTY CLAY, some gravel; brown, organic matter, rootlets; SS 5 0 cohesive, w~PL, firm GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 179.85 0.69 (CL-ML) sandy SILTY CLAY to sandy CLAYEY SILT, some to trace gravel; brown to grey, (TILL); cohesive, w~PL to w<PL, stiff to hard 2 SS 12 0 -becoming grey at 1.5 m depth SS 17 0 3 SS 14 0 5 SS 34 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stern Auger SS 6 66 SS 38 0 -0.3 m grey sandy silt seam at 7.6 m depth 0 8A SS 42 8B (CL) SILTY CLAY, layered with thin sand seams; grey; cohesive, w<PL, hard 9 9 SS 42 0 CONTINUED NEXT PAGE

DEPTH SCALE 1:50

### **RECORD OF BOREHOLE:** 17-2

SHEET 2 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 16, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES 10-4 STRATA PLOT 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **I** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 (CL) SILTY CLAY, layered with thin sand seams; grey; cohesive, w<PL, hard GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JULTB 10 SS 37 d 11 169.41 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 7.9 m below ground surface. 12 2. Groundwater measured at a depth of 10.6 m below ground surface upon completion of drilling. 13 14 15 16 17 18 19

DEPTH SCALE

20

1:50

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-3

SHEET 1 OF 2

BORING DATE: March 14, 2017

DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) GROUND SURFACE 181.3 FILL - TOPSOIL 0.00 FILL - (ML) sandy CLAYEY SILT; brown, SS 10 0 organic matter, rootlets; cohesive, w<PL, frozen GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 180.66 FILL - (SP) gravelly SAND; brown, oxidation staining, silty clay pockets; non-cohesive, moist, compact 2 SS 18 (CL) SILTY CLAY; bown; cohesive, w>PL, stiff to very stiff SS -becoming grey at 2.1 m depth SS 18 0 5 SS 13 -177.30 4.04 (ML) sandy CLAYEY SILT, some gravel; grey, (TILL); cohesive, w<PL, stiff to hard CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger -gravel seam between 4.7 m and 4.9 m depth SS 13 6 0 SS 36 0 174.26 7.09 (ML-SM) sandy SILT to SILTY SAND; grey; non-cohesive, wet, compact to very SS 18 0 9 SS 89/ 0.23 9 0 171.74 9.60 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

LOGGED: MB Golder CHECKED: EW

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-3

BORING DATE: March 14, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES **BORING METHOD** ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-4</sup> 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 Groundwater encountered during drilling at a depth of 4.6 m below ground surface. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 2. Groundwater measured at a depth of 5.5 m below ground surface upon completion of drilling. 11 12 13 14 15 16 17 18 19 20

Golder Associates

DEPTH SCALE 1:50

LOGGED: MB CHECKED: EW

1:50

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-4

BORING DATE: March 14, 2017

SHEET 1 OF 2 DATUM: Geodetic

CHECKED: EW

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 GROUND SURFACE 180.55 FILL - TOPSOIL FILL - (SM) SILTY SAND, some gravel; 0.15 SS 3 0 brown, oxidation staining; non-cohesive, moist, loose GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 179.87 0.69 (CL) SILTY CLAY; brown, oxidation staining; cohesive, w~PL to w<PL, stiff 2 SS 12 SS 15 3 С -becoming grey at 2.1 m depth SS 13 0 177.66 2.90 (ML) sandy CLAYEY SILT, some gravel (TILL); grey; cohesive, w<PL, very stiff to SS 24 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 31 6 (ML) sandy SILT; grey; non-cohesive, grey, dense to very dense ∑ 14-MAR-17 SS 37 SS 44 9 9 SS 76 0 170.95 END OF BOREHOLE CONTINUED NEXT PAGE DEPTH SCALE LOGGED: MB Golder

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-4

BORING DATE: March 14, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17\_JJL/TB 2. Borehole caved to a depth of 6.1 m below ground surface upon completion of drilling. 11 3. Groundwater measured at a depth of 6.1 m below ground surface upon completion of drilling. 12 13 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: MB Golder

1:50

CHECKED: EW

LOCATION: SEE FIGURE 1

RECORD OF BOREHOLE: 17-5

BORING DATE: March 15, 2017

SHEET 1 OF 2

DATUM: Geodetic

ш	QC	SOIL PROFILE			SAM	ИРLI	ES	DYNAMIC PENETRATION \ RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	<b></b>	
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	~	_	BLOWS/0.3m	RESISTANCE, BLOWS/0.3m  20 40 60 80  SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○  20 40 60 80	10 <sup>6</sup> 10 <sup>5</sup> 10 <sup>4</sup> 10 <sup>3</sup>   WATER CONTENT PERCENT   Wp   WI 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		179.67				40 00 00	10 20 30 40		
Ü		FILL - TOPSOIL FILL - (SP) gravelly SAND, trace silt; brown, organic matter; non-cohesive, moist, compact		0.00 0.12 178.99	1	ss	10				50 mm Diameter Monitoring Well
1		(ML) sandy SILT; brown; non-cohesive, wet, compact		0.69	2	ss	12		0		
2		(CL) SILTY CLAY, trace sand; grey; cohesive, w <pl to="" w="">PL, firm to stiff</pl>		1.37	3	SS	12				
					4	SS	8		0		
3					5	ss	7		ф 		
5	CME 55 Trackmount Power Auger	(ML-CL) SILTY CLAY to CLAYEY SILT, some sand; grey, (TILL); cohesive, w <pl, hard<="" stiff="" td="" to=""><td></td><td>175.51 4.17</td><td>6</td><td>SS</td><td>19</td><td></td><td></td><td></td><td>Bentonite <math>\frac{}{15\text{-MAR-}17}</math></td></pl,>		175.51 4.17	6	SS	19				Bentonite $\frac{}{15\text{-MAR-}17}$
7					7	SS	15				IS-MAR-17
8					8	SS	32				
9					9	SS	12				
10		CONTINUED NEXT PAGE		1	-		_				
DE 1:		SCALE	1	1				Golder Associates			OGGED: MB

### **RECORD OF BOREHOLE:** 17-5

SHEET 2 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 15, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 (ML-CL) SILTY CLAY to CLAYEY SILT, some sand; grey, (TILL); cohesive, w<PL, stiff to hard GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 10 SS 12 11 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 168.02 (ML) sandy SILT; grey; non-cohesive, wet, compact to very dense 11.66 12 SS 17 11 Silica Sand and Screen 13 12 SS 72 14 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 7.6 m below ground surface. 15 2. Groundwater measured at a depth of 5.6 m below ground surface upon completion of drilling. 16 17 18 19 20

DEPTH SCALE

1:50

LOGGED: MB Golder CHECKED: EW

### **RECORD OF BOREHOLE:** 17-6

SHEET 1 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 13, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 182.34 FILL - TOPSOIL 0.00 181.99 0.35 SS 8 FILL - (SM) SILTY SAND; dark brown, organic matter, rottlets; cohesive, moist, 181.66 0.69 FILL - (SP/GP) SAND and GRAVEL, trace fines; brown; non-cohesive, wet, compact to dense 2 SS 21 0 ∑ 13-MAR-17 SS 30 0 180.21 2.13 (CL) SILTY CLAY, trace sand, trace gravel; grey; cohesive, w~PL to w>PL, stiff to very soft SS 11 5 SS 8 0 >100 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Aurer 6 SS 0 Φ->100 (SM) SILTY SAND; grey; non-cohesive, wet, compact to very dense SS 17 0 SS 88 9 SS 83 0 172.74 9.60 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-6

BORING DATE: March 13, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-4</sup> 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 Groundwater encountered during drilling at a depth of 1.5 m below ground surface. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 2. Groundwater measured at a depth of 1.5 m below ground surface upon completion of drilling. 11 12 13 14 15 16 17 18 19 20

DEPTH SCALE 1:50

LOGGED: PT Golder Associates CHECKED: SEMP

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE: 17-7**

SHEET 1 OF 2

DATUM: Geodetic

BORING DATE: March 16, 2017

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 180.08 TOPSOIL (SM) SILTY SAND to gravelly SAND, silty clay pockets; brown, oxidation staining; non-cohesive, moist to wet, loose 0.15 SS 7 2 SS 9 (CL) SILTY CLAY, trace sand; grey, layered; cohesive, w~PL to w>PL, stiff SS 12 0 SS 15 5 SS 10 176.05 4.04 (CL-ML) sandy CLAYEY SILT to sandy SILTY CLAY, trace to some gravel; grey, o CME 55 Trackmount Power Auger 108 mm I.D H∧ll∞... ∩ (TILL); cohesive, w~PL to w>PL, very stiff to hard SS 46 6 0 SS 63 0 SS 15 ∑ 16-MAR-17 9 9 SS 13 CONTINUED NEXT PAGE DEPTH SCALE

DEPTH 1 : 50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

Golder LOGGED: MB
Associates CHECKED: SEMP

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-7

SHEET 2 OF 2

BORING DATE: March 16, 2017

DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) --- CONTINUED FROM PREVIOUS PAGE ---10 169.95 (SM) SILTY SAND; grey; non-cohesive, wet, very loose 10.13 GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIMICLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17\_JUL/TB CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stern Auger SS 10 0 11 169.03 (SP) SAND, some fines, trace gravel; grey; non-cohesive, wet, compact 12 SS 11 19 END OF BOREHOLE Notes: 13 1. Groundwater encountered during drilling at a depth of 1.5 m below ground surface. 2. Groundwater measured at a depth of 9.0 m below ground surface upon completion of drilling. 14 15 16 17 18 19 20

DEPTH SCALE 1:50

LOGGED: MB Golder Associates CHECKED: SEMP

#### **RECORD OF BOREHOLE:** 17-8

SHEET 1 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 16, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 GROUND SURFACE 180.90 FILL - TOPSOIL 0.00 FILL - (SM) SILTY SAND, trace gravel; SS 16 0 brown, organic matter, rootlets; non-cohesive, mosit, compact GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 180.22 (SM) SILTY SAND, some gravel to gravelly; brown, oxidation staining, silty clay pockets; non-cohesive, moist, 2 SS 10 МН compact SS 16 (CL) SILTY CLAY; grey; cohesive, w>PL, firm to very stiff SS 10 5 SS 17 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 6 6 (CL-ML) sandy CLAYEY SILT to sandy SILTY CLAY, some gravel; grey, (TILL); cohesive, w~PL to w>PL, hard SS 50/ 0.13 7 0 SS 38 0 ∑ 16-MAR-17 9 9 SS 45 171.30 9.60 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

LOGGED: MB Golder CHECKED: EW

LOCATION: SEE FIGURE 1

**RECORD OF BOREHOLE:** 17-8

BORING DATE: March 16, 2017

SHEET 2 OF 2 DATUM: Geodetic

Щ.	HOH	SOIL PROFILE	1.		SAI	MPLE		DYNAMIC PENETRA RESISTANCE, BLOV		HYDRAULIC CONDUCTIVITY, k, cm/s	وٰڐ	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 I I SHEAR STRENGTH Cu, kPa	60 80 \\ nat V. + Q - ● \\ rem V. ⊕ U - ○	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 1  WATER CONTENT PERCE  Wp I → W I	NT   55	OR STANDPIPE INSTALLATION
	ω	CONTINUED FROM PREVIOUS PAGE	ST	(''')		+	В	20 40	60 80	10 20 30	10	
10		Note:										
- 11		Groundwater measured at a depth of 8.1 m below ground surface upon completion of drilling.										
12												
13												
14												
15												
16												
17												
18												
19												
- 20												
DEI	PTH S	CALE							Golder associates			LOGGED: MB

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

1:50

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE: 17-9**

SHEET 1 OF 2

CHECKED: EW

DATUM: Geodetic

BORING DATE: March 17, 2017

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 183.3 0.00 183.10 0.21 FILL - TOPSOIL FILL - (CL) sandy SILTY CLAY; dark brown, organic matter, rootletsl cohesive, SS 9 (ML) sandy CLAYEY SILT, some gravel; brown, (TILL); cohesive, w<PL, stiff to 2 SS 14 0 SS 25 0 3 -becoming grey at 2.1 m depth SS 18 МН ∑ 17-MAR-17 (SM) SILTY SAND; grey; non-cohesive, wet, loose to compact SS 6 0 o CME 55 Trackmount Power Auger 108 mm LD H∞ll∞... ~. SS 21 178.44 4.88 6B (CL) SILTY CLAY; grey; cohesive, w<PL to w~PL, very stiff to hard 0 SS 17 0 SS 80 0 9 SS 50/ 0.15 0 CONTINUED NEXT PAGE DEPTH SCALE LOGGED: PT **Golder** 

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE: 17-9**

BORING DATE: March 17, 2017

SHEET 2 OF 2

DATUM: Geodetic

, ALE	НОР.	SOIL PROFILE	T .		SAI	MPLE		DYNAMIC PENET RESISTANCE, BL	RATION OWS/0.3m	,		AULIC CO k, cm/s			Ţ	AL NG	PIEZOMETER
DEPIH SCALE METRES	G MET	DESCRIPTION	A PLOT	ELEV.	BER	TYPE	S/0.3m	20 40 SHEAR STRENGT	60 TH nat V.	80 + Q - ●		0 <sup>-6</sup> 10 L ATER CO			0 <sup>3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
7 ∏ Ā <u>Ē</u>	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH (m)	NUMBER	Ξ	BLOWS/0.3m	Cu, kPa	rem V.	⊕ U-O	W	·—	→W		WI	ADE LAB.	INSTALLATION
10		CONTINUED FROM PREVIOUS PAGE	0,					20 40	60	80	1	0 2	0 3	U 4	10		
10		(CL) SILTY CLAY; grey; cohesive, w <pl hard<="" stiff="" td="" to="" very="" w~pl,=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl>															
· 11	ver Auger n Auger	(SM) SILTY SAND, some gravel to gravelly; grey; non-cohesive, wet, very dense		172.43 10.88	10A 10B	ss (	82/ 0.28				0						
12	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger				11	ss (	90/ 0.25					0					
. 14		END OF BOREHOLE		169.35	12	ss (	50/ 0.10					0					
		Notes:		13.30													
		Groundwater encountered during drilling at a depth of 3.0 m below ground surface.															
15		Groundwater measured at a depth of 2.6 m below ground surface upon completion of drilling.															
16																	
16																	
17																	
18																	
19																	
- 20																	
DEI	PTH S	 SCALE		1		[		Â	Gold Assoc	lar.	<u> </u>				<u> </u>	LC	OGGED: PT

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-10

BORING DATE: March 23, 2017

SHEET 1 OF 2 DATUM: Geodetic

ا ب	무	SOIL PROFILE			SA	MPLE	≣S	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		RAULIC CONDUCTIVITY, k, cm/s	밀	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● Cu, kPa rem V. ⊕ U - ○	W	10 <sup>6</sup> 10 <sup>5</sup> 10 <sup>4</sup> 10 <sup>3</sup> VATER CONTENT PERCENT  /p	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	_	GROUND SURFACE	S	195.72			_	20 40 60 80		10 20 30 40		
0		(CL) sandy SILTY CLAY; brown, rootlets; cohesive, w <pl, firm<="" td=""><td></td><td>0.00</td><td>1</td><td>ss</td><td>7</td><td></td><td></td><td>0</td><td></td><td></td></pl,>		0.00	1	ss	7			0		
1		(CL) sandy SILTY CLAY, some gravel; brown (TILL); cohesive, w <pl, stiff="" to<br="">hard</pl,>		0.48		ss	12			0		
						-						
2					3	ss	21		C			
					4	SS	50/ 0.10			0		
3		-oxidation staining above 2.9 m depth			5	ss	50/ 0.08		0			
4	ger ir	-becoming grey below 4.0 m depth										
	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger		***		6	ss	56		C			
5	CME 55 Tra 108 mm I.D.					-						
6					7	ss	44		(	0		
7												
8					8	ss	67/ 0.20		(	o l		
9		(SM) SILTY SAND, fine; grey; non-cohesive, moist, very dense		187.11 8.61								∑ 23-MAR-17
		END OF BOREHOLE		186.12 9.60	9	ss	92			0		
10		CONTINUED NEXT PAGE	-			-	_		- — —			

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-10

BORING DATE: March 23, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-4</sup> 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 1. Borehole caved to a depth of 8.8 m below ground surface upon completion of drilling. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 2. Groundwater measured at a depth of 8.5 m below ground surface upon completion of drilling. 11 12 13 14 15 16 17 18 19 20

DEPTH SCALE 1:50

LOGGED: MB Golder Associates CHECKED: EW

# **RECORD OF BOREHOLE: 17-11**

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 23, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 GROUND SURFACE 198.38 FILL - (CL) sandy SILTY CLAY; dark brown, rootlets; cohesive, w<PL, firm SS 6 0 197.69 (CL) sandy SILTY CLAY; brown to grey, (TILL); cohesive, w~PL, stiff to hard 2 SS 8 0 SS 16 3 SS 29 5 SS 58 o CME 55 Trackmount Power Auger 108 mm I.D HAILAN SS 6 32 -becoming grey at 6.1 m depth SS 32 0 ∑ 23-MAR-17 (CL-ML) SILTY CLAY to sandy CLAYEY SILT; grey, (TILL); cohesive, w~PL, stiff to hard SS 9 -auger grinding at 8.8 m depth on cobble or boulder 9 9 SS 50/ 0.10 0 CONTINUED NEXT PAGE

Golder

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

LOGGED: MB
CHECKED: SEMP

SHEET 1 OF 2

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-11

BORING DATE: March 23, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** - WI (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 188.24 10.13 (SP) SAND, some fines; grey; non-cohesive, wet, loose to dense GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIMICLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17\_JUL/TB CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers 10 SS 8 0 11 12 SS 11 35 0 END OF BOREHOLE Notes: 13 1. Groundwater encountered during drilling at a depth of 7.6 m below ground surface. 2. Groundwater measured at a depth of 7.0 m below ground surface upon completion of drilling. 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: MB Golder Associates

1:50

CHECKED: SEMP

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-101

BORING DATE: March 16, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -<del>0</del>W Wp (m) 60 GROUND SURFACE 191.27 TOPSOIL (CL) sandy SILTY CLAY, trace gravel; brown, organic matter, rootlets; cohesive, w>PL, firm to stiff 0.15 SS 6 0 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 2 SS 10 0 (CL) SILTY CLAY, some sand, trace gravel; light brown to grey, (TILL); w<PL to w~PL, very stiff SS 22 SS 15 0 -oxidation staining above 3.0 m depth 5 SS 18 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger - auger grinding between 4.6 m and 4.9 m depth on cobble or boulder. SS 6 16 - becoming grey at 4.9 m depth SS 15 0 SS 22 0 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface. 9 2. Groundwater measured at a depth of 7.3 m below ground surface upon completion of drilling. 10 DEPTH SCALE LOGGED: PT Golder

1:50

CHECKED: AP

#### **RECORD OF BOREHOLE:** 17-102

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 15, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 187.66 0.00 187.45 0.21 FILL - TOPSOIL FILL - (CL) SILTY CLAY, some sand, trace gravel; dark brown, organic matter, SS 8 0 rootlets; cohesive, w~PL, firm GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 186.98 0.69 (CL) SILTY CLAY, some sand, some gravel; brown, oxidation staining; cohesive, w>PL to w~PL, firm to hard 2 SS 5 0 SS 54/ 0.25 (ML) Sandy CLAYEY SILT, some to trace gravel; brown to grey, (TILL); cohesive, w<PL to w~PL, hard SS 105 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger - becoming grey at 2.4 m depth 5 SS 85 0 SS 90/ 0.25 6 0 SS 181.11 6.55 END OF BOREHOLE 1. Borehole dry upon completion of drilling. 9

DEPTH SCALE

1:50

10

Golder

SHEET 1 OF 1

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-103

BORING DATE: March 16, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES HYDRAULIC CONDUCTIVITY, SOIL PROFILE **BORING METHOD** ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER TYPE STANDPIPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp -(m) 60 20 GROUND SURFACE 184.75 TOPSOIL 0.00 SS 4 (CL) sandy CLAYEY SILT; dark brown, organic matter, rootlets; cohesive, w~PL, GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH LAND HOLDINGS INCIYORK DOWNS GOLF COURSEI02 DATA/GINT/1413472 2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 0 (SP/GP) SAND and GRAVEL, trace fines; brown; non-cohesive, wet, loose 0.82 0.94 SS 7 2B (CL) SILTY CLAY, some sand, trace gravel; brown to grey, oxidation staining; cohesive, w~PL, firmt to stiff SS 14 0 2 (CL) SILTY CLAY, some sand, trace gravel; grey, (TILL); cohesive, w>PL, stiff SS 11 lo CME 55 Trackmount Power Auger 181.86 (CL) sandy SILTY CLAY, trace gravel; grey, (TILL); cohesive, w<PL, hard 5 SS 55 1081 - auger grinding between depths of 4.6 m ss 50/ 0.08 мн 0 to 5.2 m on cobble or boulder 7 SS 50/ 0.08 0 178.43 END OF BOREHOLE 1. Groundwater encountered during drilling at a depth of 0.8 m below ground surface. 2. Borehole dry upon completion of drilling. 9 10 DEPTH SCALE LOGGED: PT Golder

1:50

CHECKED: AP

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-104

DATUM: Geodetic BORING DATE: March 15, 2017

SHEET 1 OF 1

۱ ۱	ТНОБ	SOIL PROFILE	1_		SAM	PLES	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	- NG AL	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	BLOWS/0.3m	20 40 60 80 SHEAR STRENGTH nat V. + C Cu, kPa rem V. ⊕ U	10 <sup>6</sup> 10 <sup>5</sup> 10 <sup>4</sup> 10 <sup>3</sup> -  Q - ● WATER CONTENT PERCENT Up I	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	Φ.	GROUND SURFACE	S	. ,		<u>m</u>	20 40 60 80	10 20 30 40	-	
- 0		TOPSOIL	EEE	186.69 0.00						
		(CL) sandy SILTY CLAY, trace gravel; light brown; cohesive, w~PL, firm		186.48 0.21	1 5	SS 9		0		50 mm Diameter Monitoring Well
. 1		(CL) sandy SILTY CLAY, trace to some gravel; light brown to grey, (TILL), crushed rock fragments, oxidation staining; cohesive, w <pl, stiff="" stiff<="" td="" to="" very=""><td></td><td>186.01 0.69</td><td>2 \$</td><td>SS 13</td><td></td><td>0</td><td></td><td></td></pl,>		186.01 0.69	2 \$	SS 13		0		
2		-auger grinding between 1.5 m and 4.6 m depth on cobble or boulder			3 5	SS 19		0		
	ger er	(CL-ML) SILTY CLAY to CLAYEY SILT, some to trace sand; grey; cohesive, w~PL, stiff to very stiff		184.41 2.29	4 5	SS 19				Bentonite
3	nt Power Au									
	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger				5 5	SS 20				
5	0 =				6 8	SS 12				Silica Sand and Screen
6		-layered at 6.1 m depth			7 \$	SS 13				
7		END OF BOREHOLE  Note:  1. Borehole dry upon completion of drilling.		6.55						
. 8										
9										
10										
DE	PTH S	CCALE	1	<u>ı</u>			Golder			L OGGED: PT IECKED: AP

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE: 17-105**

BORING DATE: March 15, 2017

DATUM: Geodetic

SHEET 1 OF 1

L L	НОР	SOIL PROFILE			SAME	PLES	DYNAMIC PENET RESISTANCE, BI	TRATION LOWS/0.3m	)	HYDRAULIC C k, cm/s	ONDUCTIVITY,		PIEZOMETER
METRES	BORING METHOD		STRATA PLOT	ELEV.	监	BLOWS/0.3m	20 40		80 '		0-5 10-4 10-3	ADDITIONAL LAB. TESTING	OR STANDPIPE
M.	ZING	DESCRIPTION	ATA	DEPTH	NUMBER	/SMC	SHEAR STRENG Cu, kPa	TH nat V. rem V	+ Q- ● O-U ⊕.		ONTENT PERCENT  W  W	VDDI.	INSTALLATION
5	BOF		STR/	(m)	ž	BLC	20 40	60	80	Wp <b>I</b> 10 2	<del>────</del> <b>W</b> I WI 20 30 40	43	
		GROUND SURFACE		191.96			20 40	1		10 2			
0		FILL - TOPSOIL		0.00									
		FILL - (CL) sandy SILTY CLAY, trace		0.21	1 S	s 8					,		
		gravel; brown, rootlets, organic matter; cohesive, w~PL, firm	$\otimes$	1									
			-	191.28 0.69									
		(CL) sandy SILTY CLAY, trace gravel; light brown, oxidation staining; cohesive,		a 1									
1		w~PL, very stiff			2 S	S 18				0			
				190.59									
		(SM) SILTY SAND, some gravel; light	4	1.37									
		brown, (TILL), oxidation staining; non-cohesive, moist, compact				_							
					3 S	S 20							
2				189.83									
		(ML) Sandy SILT, some gravel; brown to grey, (TILL), oxidation staining;	4	2.13									
		non-cohesive, moist, dense to very	7		4 S	s 79/ 0.20							
		dense				0.20							
3		-auger grinding between 3.0 m and		]	5 S	s 50/ 0.05							
		-auger grinding between 3.0 m and 4.6 m depth on cobble o boulder		1	- S	0.05				0			
	\uger ger		9 4	]									
	wer A												
	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger			]									
4	4ollov												
	Track		4										
	E 55		7 4										
	S S				6 S	s 50/ 0.02				0			
5			40										
			4										
			4 4	]									
6		becoming grov at 6.1 m denth	4	]									
		-becoming grey at 6.1 m depth	4		7 S	S 49							
			2 4	] [									
7													
			4	]									
			9 4	1									
				}	$\neg$								
8				400.00	8 S	S 61							
U		END OF BOREHOLE	4:14	183.88	-	+							
		Note:											
		Borehole dry upon completion of											
		drilling.											
9													
·													
10													
		I		1				<u> </u>		<u> </u>			
DE	PTH S	SCALE						Gol Asso	dor			LC	GGED: PT
1:							<b>\7</b> ≡	וטיט זיק	uci				ECKED: AP

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-106

BORING DATE: March 17, 2017

DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES HYDRAULIC CONDUCTIVITY, SOIL PROFILE **BORING METHOD** ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER TYPE STANDPIPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -<del>0</del>W Wp (m) GROUND SURFACE 181.71 FILL - TOPSOIL 0.00 0 50 mm Diameter Monitoring Well 181.38 SS 7 FILL - (CL) sandy SILTY CLAY, trace 1B 0 gravel; brown, organic matter, rootlets; cohesive, w~PL, firm GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB (CL) SILTY CLAY, some sand; brown, organic staining, rootlets; cohesive, w>PL, firm to stiff 2 SS 9 0 ЗА SS 5 179.79 1.92 3B 0 (SM) SILTY SAND; brown; non-cohesive, wet, loose to compact SS 25 178.82 (CL) SILTY CLAY, trace sand; grey; cohesive, w~PL, stiff 5 SS 12 0 Bentonite 177.67 4.04 (CL) SILTY CLAY, some sand, some gravel; grey, (TILL); cohesive, w<PL, CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 32 6 0 ss 50/ 0.10 7 SS 53 173.10 8.61 (SM) SILTY SAND, trace gravel; grey, non-cohesive, wet, very dense Silica Sand and 9 SS 78 0 MH 172.14 9.57 0 (CL) SILTY CLAY, some sand, trace gravel; grey, (TILL); cohesive, w<PL, CONTINUED NEXT PAGE DEPTH SCALE

1:50

Golder

SHEET 1 OF 2

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-106

BORING DATE: March 17, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER 10-4 STRATA PLOT 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 (CL) SILTY CLAY, some sand, trace gravel; grey, (TILL); cohesive, w<PL, hard GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 10 SS 50/ 0 11 170.59 11.13 END OF BOREHOLE Note: 1. Groundwater encountered during drilling at a depth of 2.3 m below ground surface. 12 13 14 15 16 17 18 19 20

DEPTH SCALE 1:50

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-107

BORING DATE: March 14, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 20 GROUND SURFACE 186.03 0.00 185.82 0.21 TOPSOIL (CL) sandy SILTY CLAY, trace gravel; light brown, oxidation staining; cohesive, 1 SS 4 w~PL to w<PL, firm to very stiff GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 2 SS 16 0 3 SS 16 2 (CL-ML) SILTY CLAY; grey, layered; cohesive, w<PL to w~PL, stiff to very stiff SS 16 -becoming grey at 2.1 m depth CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers 5 SS 15 SS 13 6 SS 17 0 179.48 6.55 END OF BOREHOLE 1. Borehole dry upon completion of drilling. 9 10 DEPTH SCALE LOGGED: PT **Golder** 

1:50

CHECKED: SEMP

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-108

BORING DATE: March 14, 2017

DATUM: Geodetic

SHEET 1 OF 1

Щ	员	SOIL PROFILE			SA	MPLE	S	DYNAMIC PENETRA RESISTANCE, BLOV	'S/0.3m		k, cm/s	CONDUCTIVIT	Τ, Τ	اڳد	PIEZOMETER
METRES	BORING METHOD		STRATA PLOT	ELEV.	ER		BLOWS/0.3m	20 40	60 80	`		0 <sup>-5</sup> 10 <sup>-4</sup>	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
ĒΕ	SING	DESCRIPTION	ATA I	DEPTH	NUMBER	TYPE	/SMC	SHEAR STRENGTH Cu, kPa	nat V. + Q · rem V. ⊕ U ·	- <b>•</b>		ONTENT PER		AB. T	INSTALLATION
5	BÖ		STR/	(m)	z	.	BLC	20 40	60 80		Wp <b>I</b> 10	20 30	I WI 40	43	
_		GROUND SURFACE		183.46		1					Ĭ	Ĭ	Ĭ		
0		FILL - TOPSOIL		0.00 183.25											
		FILL - (CL) SILTY CLAY, some sand, trace gravel; dark brown, organic matter, rootlets; cohesive, w>PL, firm		0.21 182.78	1	SS	7					0			
1		(CL) SILTY CLAY, some sand; light brown, oxidation staining; cohesive, w>PL, stiff		0.69		SS	12					0			
		- becoming grey at 1.4 m depth			3	ss	11					<b>)</b>			
2		(ML) sandy CLAYEY SILT, some gravel;		181.33 2.13											
	Auger	grey, cohesive, w <pl, stiff<="" td=""><td></td><td></td><td>4</td><td>SS</td><td>14</td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td></pl,>			4	SS	14				0				
3	ount Power	(CL) SILTY CLAY; grey, layered; cohesive, w>PL, very stiff to hard		180.57 2.90		ss	15								
4	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers				5	33	15								
5					6	SS	33					0			
6					7	SS	37				0				
		END OF BOREHOLE		176.91 6.55											
		Note:													
7		Borehole dry upon completion of drilling.													
8															
9															
я															
10															
DE	PTH :	SCALE	1	1					Golder ssociate					LC	GGED: PT

# RECORD OF BOREHOLE:

17-109 PROJECT: 1413472 SHEET 1 OF 1 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 15, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH ⊖W Wp (m) GROUND SURFACE 185.77 0.00 185.56 0.21 FILL - TOPSOIL FILL - (CL) sandy SILTY CLAY; brown, organic matter, rootlets; cohesive, w>PL, 1 SS 9 С GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB (CL) SILTY CLAY, trace sand; brown, layered; cohesive, w>PL, soft to firm 2 SS 6 0 3 SS Ь ∑ 15-MAR-17 Ф + (SM) SILTY SAND; brown; non-cohesive, wet, compact SS 27 0 (CI) SILTY CLAY; grey; cohesive, w<PL, SS 50/ 0.13 5B hard to very stiff 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers SS 6 33 0 SS 32 0 SS 23 0 END OF BOREHOLE

DEPTH SCALE 1:50

9

10

Notes:

1. Groundwater encountered during drilling at a depth of 2.3 m below ground surface.

2. Groundwater measured at a depth of 2.1 m below ground surface upon completion of drilling.



#### **RECORD OF BOREHOLE:** 17-110

SHEET 1 OF 1 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 13, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES HYDRAULIC CONDUCTIVITY, SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER TYPE STANDPIPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW - wi Wp -(m) 60 20 GROUND SURFACE 183.95 FILL - TOPSOIL 0.00 183.70 0.25 50 mm Diameter Monitoring Well FILL - (ML) sandy CLAYEY SILT, trace gravel; dark brown, organic matter, 1 SS 11 0 rootlets; non-cohesive, moist, compact to GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB loose 2 SS 6 0 FILL - (SP) gravelly SAND; brown to grey; non-cohesive, moist to wet, -auger grinding at 1.7 m depth on cobble or boulder SS 24 0 SS 27 181.06 Bentonite (CL) SILTY CLAY, trace sand, trace gravel; brown to grey; cohesive, w>PL, SS 11 55 Trackmount Power Auger <u>.</u> CME ( -becoming grey at 4.6 m depth SS 11 6 0 (ML) sandy SILT, trace gravel; grey; non-cohesive, wet, compact to very dense SS 13 Silica Sand and SS 50 МН END OF BOREHOLE Note: 1. Groundwater encountered during drilling at a depth of 2.3 m below ground surface. 9 10

DEPTH SCALE 1:50

LOGGED: PT **Golder** CHECKED: AP

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-111

BORING DATE: March 14, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW - wi Wp I (m) 60 20 GROUND SURFACE 182.86 FILL - TOPSOIL 0.00 182.51 0.36 SS 5 FILL - (ML) sandy CLAYEY SILT; dark brown, organic matter, rootlets; GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB non-cohesive, moist, loose 182.13 0.73 FILL - (SP) gravelly SAND, trace fines; brown; non-cohesive, wet, loose 2 SS 9 (CL) SILTY CLAY, some sand, trace gravel; brown; cohesive, w~PL to w>PL, stiff to firm -becoming grey at 1.2 m depth SS 2 SS 9 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 5 SS 6 0 ∑ 14-MAR-17 <del>01</del> 178.75 4.11 (SM) SILTY SAND, trace gravel; grey, (TILL); non-cohesive, moist, very dense ss 100/ 0.25 0 (ML-CL) SILTY CLAY to CLAYEY SILT; grey; cohesive, w~PL, hard SS 31 176.31 6.55 END OF BOREHOLE 1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface. 2. Borehole caved to a depth of 5.8 m below ground surface upon completion of drilling. 3. Groundwater measured at a depth of 3.7 m below ground surface upon completion of drilling. 9 10 LOGGED: PT Golder

DEPTH SCALE 1:50

CHECKED: AP

#### RECORD OF BOREHOLE: 17-112

BORING DATE: March 13, 2017

LOCATION: SEE FIGURE 1 DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW - wi Wp I (m) 60 GROUND SURFACE 182.03 FILL - TOPSOIL FILL - (ML) sandy CLAYEY SILT; light brown, organic matter, rootlets; non-cohesive, moist, loose 0.15 SS 4 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 181.35 0.69 (CL) SILTY CLAY to SILTY CLAY, trace sand to sandy, trace gravel; light brown to grey; cohesive, w~PL, firm to stiff 2 SS 4 SS 12 -becoming grey at 2.3 m depth SS 12 0 3 5 SS 6 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger ⊕+ Ф + SS 6 0 ∑ 13-MAR-17  $\oplus$ (SM) SILTY SAND, trace gravel; grey; non-cohesive, wet, very dense SS 77/ 0.25 0 174.95 7.09 (CL) SILTY CLAY, some sand; grey, layered; cohesive, w~PL, hard SS 45 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface. 9 2. Borehole caved to a depth of 5.8 m below ground surface upon completion of drilling. 3. Groundwater measured at a depth of 5.3 m below ground surface upon completion of drilling.

DEPTH SCALE

1:50

Golder

SHEET 1 OF 1

#### RECORD OF BOREHOLE: 17-113

SHEET 1 OF 1 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 14, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER TYPE STANDPIPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp -(m) 60 GROUND SURFACE 181.97 FILL - TOPSOIL 0.00 181.73 0.24 FILL - (SM) SILTY SAND, trace gravel; 1 SS 5 0 brown, organic matter, rootlets; non-cohesive, moist, loose GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 181.29 0.69 FILL - (CL) sandy SILTY CLAY; brown, oxidation staining; brown; cohesive, 14-MAR-17 w~PL, compact 2 SS 11 0 (CL) SILTY CLAY, trace sand, trace gravel; grey; cohesive, w<PL to W~PL, 0 SS 9 зв 0 - sand and gravel seam at 1.7 m depth SS 15 0 3 5 SS 10 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 6A SS 10 177.10 4.88 6B (SP) gravelly SAND, some fines; grey; non-cohesive, wet, dense 0 SS 48 0 М (ML) SILT and SAND, trace gravel; grey, (TILL); non-cohesive, moist, very dense SS 59 0 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 1.5 m below ground surface. 9 2. Groundwater measured at a depth of 1.0 m below ground surface upon completion of drilling.

DEPTH SCALE

10

1:50

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-114

BORING DATE: March 10, 2017

SHEET 1 OF 1 DATUM: Geodetic ADDITIONAL LAB. TESTING PIEZOMETER 10<sup>-3</sup> STANDPIPE INSTALLATION ∑ 10-MAR-17

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> BLOWS/0.3m NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 181.41 FILL - TOPSOIL 0.00 181.11 1 SS 9 FILL - (SM/GP) SILTY SAND, some gravel to sandy GRAVEL, trace fines; GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB brown; non-cohesive, moist, loose to compact 2 SS 18 0 180.12 (CL) SILTY CLAY, trace sand, trace gravel; grey; cohesive, w<PL to w>PL, soft to very stiff SS 0 2 SS 12 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 5 SS 8 0 >100 SS 6 3 Ф  $\oplus$ 7A 0 SS 22 (ML) sandy CLAYEY SILT, some gravel; grey, (TILL); cohesive, w<PL, very stiff END OF BOREHOLE 7B 6.32 174.86 1. Groundwater measured at a depth of 2.7 m below ground surface upon completion of drilling. 9 10 DEPTH SCALE LOGGED: AK 1:50

#### RECORD OF BOREHOLE: 17-115

SHEET 1 OF 2 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 10, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) GROUND SURFACE 180.69 FILL - TOPSOIL 0.00 FILL - (CL) SILTY CLAY, trace sand, 0.18 50 mm Diameter Monitoring Well SS 7 0 trace gravel; brown; cohesive, w<PL, firm GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 179.88 (CL) SILTY CLAY, trace to some sand, trace gravel; brown; cohesive, w<PL to w>PL, firm to stiff 2 SS 11 -sand and silt seams between 0.8 m and 1.2 m depth SS 15 0 -becoming grey at 2.1 m depth SS 7 5 SS 3 0 0 Ф CME 55 Trackmount Power Auger Bentonite ss wh 6 0 175.66 5.03 (ML) SILT and SAND, some gravel to gravelly; grey, (TILL); non-cohesive, moist, dense 108 SS 34 0 SS 33 172.08 8.61 (CL) sandy SILTY CLAY, trace gravel; grey, (TILL); cohesive, w<PL, very stiff SS 20 МН

DEPTH SCALE

1:50

CONTINUED NEXT PAGE

1:50

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-115

BORING DATE: March 10, 2017

SHEET 2 OF 2 DATUM: Geodetic

CHECKED: AP

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER 10-4 STRATA PLOT 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 170.56 10.13 (SP) SAND, some fines; grey; non-cohesive, wet, loose to very dense GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17\_JUL/TB CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger - Sample 10 disturbed due to heaving 10 SS 6 0 11 Silica Sand and Screen 12 SS 11 58 0 END OF BOREHOLE 13 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: PT Golder Associates

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-116

BORING DATE: March 20, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 GROUND SURFACE 180.52 FILL - TOPSOIL 0.00 FILL - (CL) sandy SILTY CLAY; brown, SS 22 0 brick fragments; cohesive, w<PL, very stiff GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 179.84 0.69 FILL - (SP) gravelly SAND; brown; non-cohesive, wet, loose 2 SS 6 0 (CL/Cl) SILTY CLAY, some sand, trace gravel; grey; cohesive, w~PL to w>PL, SS 2 SS 13 0 CME 55 Trackmount Power Auger 5 SS 5 0 <u>.</u> Ф + 176.49 4.04 (GP) sandy GRAVEL; grey; non-cohesive, wet, compact ∑ 20-MAR-17 SS 6 19 0 (ML) sandy SILT; grey; non-cohesive, moist, very dense 7 SS 87/ 0.23 0 174.03 END OF BOREHOLE Notes: 1. Borehole caved to a depth of 4.9 m below ground surface upon completion of drilling. 2. Groundwater measured at a depth of 4.6 m below ground surface upon completion of drilling. 9 10 **Golder** 

DEPTH SCALE 1:50

LOGGED: MB CHECKED: SEMP

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-117

BORING DATE: March 14, 2017

DATUM: Geodetic

SHEET 1 OF 2

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) GROUND SURFACE 180.71 FILL - TOPSOIL 0.00 FILL - (CL) sandy SILTY CLAY; brown, 0.15 SS 7 organic matter; cohesive, w>PL, firm 180.10 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB (CL) SILTY CLAY, some sand; brown, oxidation staining; cohesive, w>PL, stiff 2 SS 12 0 SS 10 О (ML) sandy CLAYEY SILT, some gravel; grey, (TILL); cohesive, w<PL, stiff to very stiff SS 14 5 SS 22 176.68 4.04 (ML) sandy SILT; grey; non-cohesive, wet, compact to very dense CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 13 6 0 ∑ 14-MAR-17 SS 40 ss 86/ 0.23 8 9 9 SS 49 171.11 9.60 END OF BOREHOLE CONTINUED NEXT PAGE DEPTH SCALE LOGGED: MB

1:50

Golder Associates CHECKED: EW

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-117

BORING DATE: March 14, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 1. Groundwater encountered during drilling at a depth of 3.0 m below ground surface. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17\_JJL/TB 2. Borehole caved to a depth of 8.5 m below ground surface upon completion of drilling. 11 3. Groundwater measured at a depth of 5.0 m below ground surface upon completion of drilling. 12 13 14 15 16 17 18 19 20

DEPTH SCALE 1:50

LOGGED: MB Golder CHECKED: EW

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-118

BORING DATE: March 20, 2017

DATUM: Geodetic

SHEET 1 OF 1

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 181.09 TOPSOIL 0.00 (CL) SILTY CLAY, trace to some sand; SS 6 brown, oxidation staining; cohesive, w<PL to w~PL, firm to very stiff GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH LAND HOLDINGS INCIYORK DOWNS GOLF COURSEI02 DATA/GINT/1413472 2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 2 SS 13 0 SS 178.96 2.13 (ML) sandy CLAYEY SILT to sandy SILT; grey, (TILL); cohesive, w<PL, stiff SS 9  $\circ$ CME 55 Trackmount Power Auger 5 SS 14 0 (SM) SILTY SAND; grey; non-cohesive, SS 6 36 0 ∑ 20-MAR-17 SS 43 174.54 6.55 END OF BOREHOLE 1. Groundwater encountered during drilling at a depth of 4.6 m below ground surface. 2. Borehole caved to a depth of 5.8 m below ground surface upon completion of drilling. 3. Groundwater measured at a depth of 5.5 m below ground surface upon completion of drilling. 9 10 DEPTH SCALE LOGGED: MB

1:50

Golder CHECKED: SEMP

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-119

BORING DATE: March 20, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES HYDRAULIC CONDUCTIVITY, SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW - wi Wp (m) 60 GROUND SURFACE 180.74 TOPSOIL 0.00 (CL) SILTY CLAY, some sand; dark SS 5 brown, organic matter; cohesive, w>PL, GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 180.06 (CL) SILTY CLAY, trace to some sand; brown, mottled; cohesive, w~PL, stiff 2 SS 12 SS 15 0 178.61 2.13 (CL-ML) SILTY CLAY to CLAYEY SILT, some sand, some gravel; grey, (TILL); cohesive, w~PL to w<PL, very stiff to SS 16 3 5 SS 19 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 6 38  $\circ$ ∑ 20-MAR-17 SS 57 (SM) SILTY SAND; grey; non-cohesive, SS 22 0 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 7.6 m below ground surface. 9 2. Borehole caved to a depth of 6.1 m below ground surface upon completion of drilling. 3. Groundwater measured at a depth of 5.5 m below ground surface upon completion of drilling. DEPTH SCALE Golder

1:50

LOGGED: MB

CHECKED: SEMP

PROJECT: 1413472 LOCATION: SEE FIGURE 1

1:50

#### **RECORD OF BOREHOLE:** 17-120

BORING DATE: March 17, 2017

SHEET 1 OF 2 DATUM: Geodetic

CHECKED: SEMP

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 179.67 TOPSOIL (CL) SILTY CLAY, trace sand; brown to 0.15 SS 3 grey; cohesive, w~PL, soft to very stiff GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 2 SS 16 0 -becoming grey below 1.5 m depth 3 SS 15 0 SS 10 0 5 SS 7 175.64 4.04 (CL-ML) sandy CLAYEY SILT to sandy SILTY CLAY, some sand, some gravel; o CME 55 Trackmount Power Auger 108 mm I.D H∧ll∞... ∩ grey, (TILL); cohesive, w~PL, very stiff to hard SS 62 6 0 ∑ 17-MAR-17 SS 18 0 SS 23 9 9 SS 20 0 CONTINUED NEXT PAGE DEPTH SCALE LOGGED: MB Golder Associates

#### RECORD OF BOREHOLE: 17-120

SHEET 2 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 17, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) --- CONTINUED FROM PREVIOUS PAGE ---10 169.54 10.13 (CL) SILTY CLAY, trace sand; grey; cohesive, w>PL, very stiff GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 10 SS 23 0 11 168.02 (ML) sandy SILT; grey; non-cohesive, wet, very dense 11.66 12 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 11 SS 50/ 0.15 0 (CL) SILTY CLAY, some sand, trace gravel; grey, (TILL); cohesive, w<PL, 12 SS 58 14 165.04 14.63 (SM) SILTY SAND, fine; grey; non-cohesive, wet, very dense 15 ss 50/ 0.15 13 164.16 15.51 END OF BOREHOLE Notes: 16 1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface. 2. Borehole caved to a depth of 12.5 m below ground surface upon completion of drilling. 17 3. Groundwater measured at a depth of 5.5 m below ground surface upon completion of drilling. 18 19 20

DEPTH SCALE 1:50

LOGGED: MB Golder CHECKED: SEMP

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE: 17-121**

BORING DATE: May 15, 2017

SHEET 1 OF 2

DATUM: Geodetic

Щ	НОВ	SOIL PROFILE	1.		SAI	MPLE	- 1	DYNAMIC PENETRAT RESISTANCE, BLOWS	ON 8/0.3m	1	HYDR	AULIC C k, cm/s	ONDUC	TIVITY,	Ţ	일	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	ТУРЕ	BLOWS/0.3m	SHEAR STRENGTH	nat V. +	Q - •		0 <sup>-6</sup> 1 L ATER C	L ONTENT	PERCE	0 <sup>-3</sup> ⊥ NT	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
7 ∏ ≤	BORII	2233.11 1011	STRAT	DEPTH (m)	NUN	_	BLOW	Cu, kPa	rem V. ⊕	U - O		p <b> </b>			WI 40	ADI	INGTALLATION
0		GROUND SURFACE		180.00													
Ü		FILL - TOPSOIL  FILL - (SM) SILTY SAND; brown, oxidation staining; non-coheisve, moist,		0.00	1	ss	6					0					
		loose to compact															
1					2	SS	14					0					
		(CL) SILTY CLAY; brown; cohesive, w>PL, firm to stiff		178.63 1.37													
2					3	SS	10					0					
		- oxidation staining above 2.1 m depth															
		- becoming grey at 2.1 m depth			4	ss	9						0				
3					5	ss	6						0				
					5	33											
4		(ML) CLAYEY SILT and SAND, some		175.97 4.04						>100	-						
	jer ir	gravel; grey, (TILL); cohesive, w <pl, stiff<="" td=""><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>		1													
	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger	- auger grinding at 4.3 m depth on															
	unt Pov ow Ster	cobble or boulder			6	SS	13				0						
5	ackmo D. Holle																
	E 55 Ti																
	CM 108																
6																	
											_						
					7	SS .	40				0					МН	
7				1													
				1	8	ss :	22				0						
8				1	0	33											
		- auger grinding at 8.5 m depth on		171.39													
		Cobble or boulder		8.61													
9		(CL) SILTY CLAY, some sand, some gravel; grey, (TILL); compact, w <pl, hard<="" stiff="" td="" to="" very=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>															
					9	ss	18					0					
					я	33	10										
- 10		CONTINUED NEXT PAGE		1		-	- -		<del> </del>								
_				•					1	1				1	-		
DE	PTH S	CALE							Colda	<b>~</b> 1*						LC	OGGED: MB

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-121

BORING DATE: May 15, 2017

SHEET 2 OF 2 DATUM: Geodetic

Щ.	HOD		SOIL PROFILE			SA	MPLE	-	DYNAMIC PENETRA RESISTANCE, BLO	VS/0.3m	ζ.	IIIDIN	k, cm/s	NDUCTIVI	111,	T	NG.	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD			STRATA PLOT	ELEV.	ER	ш	BLOWS/0.3m	20 40		80	10			10 <sup>-3</sup>		ADDITIONAL LAB. TESTING	OR STANDPIPE
ME	RING		DESCRIPTION	RATA	DEPTH	NUMBER	TYPE	OWS	SHEAR STRENGTH Cu, kPa	nat V rem V. 6	+ Q - ● Ð U - ○	Wp		NTENT PE	RCENT WI		ADDI AB. T	INSTALLATION
-	B	<u> </u>		STE	(m)	_		BL	20 40	60	80	1			40		_	
10		_	CONTINUED FROM PREVIOUS PAGE	ЛЛЯЧ														
			(CL) SILTY CLAY, some sand, some gravel; grey, (TILL); compact, w <pl, td="" very<=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>															
			stiff to hard															∑ 15-MAY-17
	×																	15-WA1-17
	r Auge	Auger				10	ss	35					0					
11	Powe	stem,																
	nount	Nollo																
	Frackr	Ğ.			168.35													
	CME 55 Trackmount Power Auger	E I	(ML) sandy SILT; grey; non-cohesive,		11.66													
12	CM	9	wet, dense															
						11	ss	35					0					
		+	END OF BOREHOLE		167.35 12.65		$\dashv$	_								_		
,			Notes:															
13			Groundwater encountered during															
			drilling at a depth of 4.6 m below ground															
			surface.															
			Borehole caved to a depth of 11.6 m below ground surface upon completion															
14			of drilling.															
			Groundwater measured at a depth of 10.4 m below ground surface upon															
			completion of drilling.															
15																		
.0																		
16																		
17																		
18																		
10																		
19																		
20																		
										<u> </u>				I				
DE	PTH	H SC	CALE							Cold	or						LO	GGED: MB

#### **RECORD OF BOREHOLE:** 17-122

SHEET 1 OF 2

BORING DATE: March 17, 2017

LOCATION: SEE FIGURE 1 DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 GROUND SURFACE 179.47 TOPSOIL (CL) SILTY CLAY, trace sand; brown; 0.15 SS 8 cohesive, w>PL, stiff to very stiff 2 SS 14  $\vdash$ -becoming grey at 1.4 m depth - oxidation staining above 1.5 m depth 3 SS 20 0 SS 17 0 176.58 2.90 (ML) sandy SILT, some gravel; grey, (TILL); non-cohesive, compact to very dense SS 31 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Aussen - auger grinding at 4.3 m depth on cobble or boulder SS 65 6 0 SS 13 0 172.39 7.09 (SM) SILTY SAND; grey; non-cohesive, SS 18 0 9 SS 29 0 169.87 9.60 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

LOGGED: MB Golder CHECKED: EW

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE:** 17-122

BORING DATE: March 17, 2017

SHEET 2 OF 2

DATUM: Geodetic

۱ پ	유	SOIL PROFILE	1.		SA			DYNAMIC PEN RESISTANCE,	BLOW	5/0.3m	Κ.	K,	cm/s				무일	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	20 4 SHEAR STREN Cu, kPa			Q - • U - ○	10 <sup>-6</sup> WAT Wp <b>I</b> -		5 10 NTENT I	PERCE	0 <sup>3</sup> ⊥ NT WI	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
د	BO		STR	(m)	z		BLC	20 4	0	60 8	30	10	20			40	_	
- 10		CONTINUED FROM PREVIOUS PAGE Notes:											_					
		Groundwater encountered during drilling at a depth of 2.3 m below ground surface.																
11		Borehole caved to a depth of 7.2 m below ground surface upon completion of drilling.																
		Groundwater measured at a depth of 5.3 m below ground surface upon completion of drilling.																
12																		
13																		
14																		
15																		
16																		
17																		
- 18																		
19																		
20																		
DE	ртн с	CALE								Golde ssocia								GGED: MB

1:50

LOCATION: SEE FIGURE 1

**RECORD OF BOREHOLE:** 17-123

BORING DATE: March 17, 2017

SHEET 1 OF 2 DATUM: Geodetic

CHECKED: SEMP

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 179.75 TOPSOIL (CL) sandy SILTY CLAY, some gravel; brown, oxidation staining; cohesive, w<PL, firm to stiff 0.15 SS 6 0 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 2 SS 13 0 SS (ML) sandy CLAYEY SILT; brown, (TILL); cohesive, w<PL, stiff to very stiff SS 22 0 - oxidation staining above 2.7 m depth 5 SS 20 0 - becoming grey at 3.4 m depth CME 55 Trackmount Power Auger ∑ 17-MAR-17 SS 6 10 0 (SM) SILTY SAND; grey; brown; non-cohesive, wet, very loose to compact SS 3 0 SS 18 0 171.14 8.61 (SP) SAND, trace fines; grey; non-cohesive, wet, very dense 9 SS 51 0 CONTINUED NEXT PAGE DEPTH SCALE LOGGED: MB Golder

1:50

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-123

BORING DATE: March 17, 2017

DATUM: Geodetic

SHEET 2 OF 2

CHECKED: SEMP

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) --- CONTINUED FROM PREVIOUS PAGE ---10 169.62 (CL) SILTY CLAY, trace sand, trace gravel; grey; cohesive, w~PL, very stiff 10.13 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATAIGINT/1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers 10 SS 25 0 11 168.17 11.58 (CL) SILTY CLAY, some sand, trace gravel; grey, (TILL); cohesive, w<PL, hard 12 SS 53 11 0 END OF BOREHOLE Notes: 13 1. Groundwater encountered during drilling at a depth of 4.6 m below ground surface. 2. Borehole caved to a depth of 8.2 m below ground surface upon completion of drilling. 14 3. Groundwater measured at a depth of 4.6 m below ground surface upon completion of drilling. 15 16 17 18 19 20 DEPTH SCALE LOGGED: MB **Golder** 

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE:** 17-124

BORING DATE: March 20, 2017

SHEET 1 OF 1 DATUM: Geodetic

Щ	2	₫	SOIL PROFILE			SA	MPLI	≣S	DYNAMIC PENETRA RESISTANCE, BLOW	S/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	9-9	PIEZOMETER
DEPTH SCALE METRES	BOPING METHOD		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	20 40 SHEAR STRENGTH Cu, kPa	60 80 nat V. + Q - ● rem V. ⊕ U - ○	10 <sup>-6</sup> 10 <sup>-5</sup> 10 <sup>-4</sup> 10 WATER CONTENT PERCEN		OR STANDPIPE INSTALLATION
7 _	90			STRA	DEPTH (m)	N	-	BLO/	20 40	60 80	Wp		
0	T	$\dashv$	GROUND SURFACE	-	186.73				20 40	00 00	10 20 30 40		
. 0			FILL - TOPSOIL FILL - (CL) sandy SILTY CLAY, trace gravel; dark brown, organic matter, rootlets; cohesive, w~PL, firm to stiff		0.00 0.15	1	SS	6			0		
1					185.36	2	SS	9			0		
2			FILL - (ML) sandy CLAYEY SILT, trace cobbles; grey and brown; cohesive, w~PL, stiff		1.37		SS	10			0		
	iger	ers	(ML) sandy SILT, some gravel; brown to grey, (TILL), oxidation staining; non-cohesive, wet - moist, compact to dense	× 4 2 4 2 4 2	184.60 2.13		SS	11			0		∑ 20-MAR-17
3	CME 55 Trackmount Power Auger	. Hollow Stem Aug	-becoming grey at 3.0 m depth	\$ 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		5	SS	32			0		
4	CME 55 Tr	108 mm I.D		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		6	SS	27					
6		_	(CL) SILTY CLAY, trace sand, trace gravel; grey, (TILL); cohesive, w~PL, very stiff	THE REPORT OF THE PARTY OF THE	181.17 5.56		SS	22			0		
7			END OF BOREHOLE  Notes:  1. Groundwater encountered during drilling at a depth of 2.3 m below ground surface.	_\$\text{X}\text{X}	180.18 6.55								
8			Borehole open upon completion of drilling.     Groundwater measured at a depth of 2.4 m below ground surface upon completion of drilling.										
9													
10 DE	:PTI	H SO	CALE							Golder ssociates		L	OGGED: PT

1:50

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-125

BORING DATE: March 20, 2017

SHEET 1 OF 2 DATUM: Geodetic

CHECKED: SEMP

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 190.41 TOPSOIL (CL) SILTY CLAY, some sand; dark brown, organic matter, rootlets; cohesive, w~PL, firm 0.15 SS 9 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 189.73 (CL-ML) sandy SILTY CLAY to sandy CLAYEY SILT, trace gravel; light brown, (TILL), oxidation staining; cohesive, w<PL to w~PL, stiff to hard 2 SS 12 Ю SS 13 0 SS 27 0 5 SS 45 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers SS 6 40 0 (SP) SAND, trace fines; grey; non-cohesive, wet, very loose ss wh 0 (CL) SILTY CLAY, trace sand, some gravel; grey, (TILL); cohesive, w~PL, very stiff to hard SS 16 <u>∑</u> 20-MAR-17 9 9 SS 56 CONTINUED NEXT PAGE DEPTH SCALE LOGGED: PT Golder

**RECORD OF BOREHOLE:** 17-125 PROJECT: 1413472 SHEET 2 OF 2 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 20, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES 10-4 STRATA PLOT 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **I** (m) 60 20 --- CONTINUED FROM PREVIOUS PAGE ---10 (CL) SILTY CLAY, trace sand, some gravel; grey, (TILL); cohesive, w~PL, very stiff to hard GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURYICAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 10 SS 50/ 179.65 10.76 END OF BOREHOLE SPLIT SPOON BOUNCING AUGER REFUSAL 11 Notes: 1. Borehole caved to a depth of 10.4 m below ground surface upon completion of drilling. 12 2. Groundwater measured at a depth of 7.9 m below ground surface upon completion of drilling. 13 14 15 16 17

Golder

DEPTH SCALE 1:50

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# **RECORD OF BOREHOLE: 17-126**

SHEET 1 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 21, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp I (m) 60 20 GROUND SURFACE 185.36 FILL - TOPSOIL 0.00 FILL - (CL) SILTY CLAY, some sand; 0.15 SS 10 dark brown, organic matter, rootlets; cohesive, w~PL, stiff (CL) SILTY CLAY, trace sand, trace gravel; light brown, mottled; cohesive, w<PL, stiff 2 SS 14 0 SS 17 0 (CL) sandy SILTY CLAY, trace gravel; light brown, (TILL); cohesive, w<PL, very SS 16 0 182.47 2.90 (ML) sandy SILT, some gravel; brown, (TILL); non-cohesive, moist to wet, compact to very dense SS 21 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers - becoming grey at 4.6 m depth SS 6 64 0 ∑ 21-MAR-17 SS 13 178.28 7.09 (CL-ML) sandy SILTY CLAY, trace gravel; grey, (TILL); cohesive, w<PL, SS 33 176.75 8.61 (SP) SAND, some fines; grey; non-cohesive, wet, very dense 9 SS 96 175.76 9.60 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

Golder LOGGED: PT
Associates CHECKED: SEMP

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-126

DATUM: Geodetic BORING DATE: March 21, 2017

SHEET 2 OF 2

Ļ	ПООН	SOIL PROFILE	1.		SA	MPL		DYNAMIC PENETR RESISTANCE, BLO	VS/0.3m		HYDRAULI k, cr	n/s	CHVITY,	T	일	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	20 40 I I SHEAR STRENGTH Cu, kPa	nat V.	80 ' + Q - •	10 <sup>-6</sup> WATER	R CONTEN	T PERCE	0 <sup>3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
DE CE	BORII		STRAI	DEPTH (m)	NON	F	BLOV	Cu, kPa 20 40	rem V.	⊕ U- ○ 80	Wp <b>I</b> —	O <sup>W</sup>		WI 10	AE	
- 10		CONTINUED FROM PREVIOUS PAGE	-					20 40	30	00	10	20	30 2	10		
		Notes:														
		Groundwater encountered during drilling at a depth of 6.1 m below ground surface.														
11		Borehole caved to a depth of 6.1 m below ground surface upon completion of drilling.														
		Groundwater measured at a depth of 5.5 m below ground surface upon completion of drilling.														
- 12																
13																
14																
15																
- 16																
- 17																
- 18																
19																
- 20																
DE	PTH S	CALE							Gale	ler iates					LO	GGED: PT

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-127

DATUM: Geodetic BORING DATE: March 21, 2017

SHEET 1 OF 2

빌	로	SOIL PROFILE	1.			/IPLE	$\exists$	DYNAMIC PENETRATIC RESISTANCE, BLOWS/	J.3m	k, cm/s		물일	PIEZOMETER
DEP IN SCALE METRES	BORING METHOD		STRATA PLOT		띪	_	0.3m	20 40 6			0 <sup>-4</sup> 10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
- 된	SING	DESCRIPTION	TA F	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH n Cu, kPa re	at V. + Q - ● em V. ⊕ U - ○	WATER CONTENT		IDDI IB. TI	INSTALLATION
ă	BOF		3TR/	(m)	ž		BLO			Wp <b>I</b> → W		⋖ጟ	
		GROUND SURFACE	- 37	189.51	+	+	$\dashv$	20 40 6	0 80	10 20 3	30 40		
0		TOPSOIL	EEE	0.00									
		(CL) SILTY CLAY, some sand, trace gravel; brown, organic matter to 0.7 m		0.15	1	ss	7						50 mm Diameter Monitoring Well
		depth; cohesive, w>PL, firm to stiff											Worldoning Well
							40						
1					2	SS	10						
				188.14									
		(SM/ML) SILTY SAND to sandy SILT, trace to some gravel; brown, oxidation	4	1.37	$\dashv$								
		staining, (TILL); non-cohesive, moist, compact to dense	4		3	ss	16						$\nabla$
2		compact to dense	4										21-MAR-17
				]	4	SS	17						
					$\dashv$								Bentonite
3			4	]	$\dashv$								23.101110
				1	5	ss :	21						1
			70	]	_								1
			4 4										
			q										
4	ا <u>آ</u> و												
	Power Auger Stem Auger												
	Powe Stem,		70	1	_								
	ount Silow \$			1	6	ss .	42						1
5	CME 55 Trackmount F 108 mm I.D. Hollow S												
	= 55 T mm l.												
	CME 108												
		-becoming grey at 5.6 m depth											1
		-sand seams between 5.6 m and 6.2 m											(A)
6		depth		183.32	7Δ								<u> </u>
		(ML) sandy SILT; grey; non-cohesive,		6.19		ss .	42						\$
		wet, dense		] [	7B	1	-			Ψ			
7				<u> </u>									Silica Sand and Screen
′													
				]									
				]	8	ss :	28						
8						1							
				] [									
				180.98									
		(CL-ML) SILTY CLAY to CLAYEY SILT, some sand, trace gravel; grey, (TILL); cohesive, w <pl, hard<="" td=""><td></td><td>8.53</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>		8.53									
		cohesive, w <pl, hard<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>											
9													
					9	ss	88						
				179.91									
		END OF BOREHOLE		9.60	T	T	T						
10			-		_		_	4		<del>   </del>			
		CONTINUED NEXT PAGE											
			•				•		1				
		CALE							older sociates				OGGED: PT

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE:** 17-127

DATUM: Geodetic BORING DATE: March 21, 2017

SHEET 2 OF 2

DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 SHEAR Cu, kPa 20	STREN	NGTH	nat V. + rem V. ⊕	Q - • U - O	10 WA Wp 10	ATER CO	DNTENT	PERCE	10°3	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	STRATA	DEPTH	NUME	TYF	BLOWS						VVP	-			WI	ADD	INSTALLATION
							0 4	40	60 8	30	10	) 2	0 3	30 4	40		
Notes:  1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface.  2. Groundwater measured at a depth of 6.1 m below ground surface upon																	
surface.  2. Groundwater measured at a depth of 6.1 m below ground surface upon																	
Groundwater measured at a depth of 6.1 m below ground surface upon completion of drilling.																	
									1		1						
					l												
	l																
1:	SCALE	SCALE	SCALE	SCALE	SCALE	SCALE	SCALE	SCALE SCALE	SCALE	SCALE	SCALE Golder Associates	SCALE Golder Associates	SCALE Golder Associates	SCALE Golder Associates	SCALE Golder Associates	SCALE Golder Associates	SCALE Golder Associates C.HE

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

1:50

#### **RECORD OF BOREHOLE:** 17-128

SHEET 1 OF 2

CHECKED: SEMP

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 20, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 20 GROUND SURFACE 190.01 FILL - TOPSOIL 0.00 FILL - (CL) SILTY CLAY, trace gravel, trace sand; brown, oganic matter, rootlets; cohesive, w~PL, firm 0.15 SS 8 0 189.33 (CL) SILTY CLAY, trace gravel, trace sand; light brown, mottled; cohesive, w~PL, stiff 2 SS 9 (CL) sandy SILTY CLAY, trace gravel; brown, (TILL), oxidation staining; cohesive, w~PL, stiff SS 13 0 187.88 (ML) sandy SILT, some gravel; brown, (TILL), oxidation staining; non-cohesive, moist, compact to dense SS 16 5 SS 43 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers 41 6 SS -auger grinding between 4.9 m and 5.2 m depth on cobble or boulder ∑ 20-MAR-17 (SP) SAND, some fines; brown; non-cohesive, wet, compact SS 13 0 SS 16 0 181.40 8.61 (CL) SILTY CLAY, some sand, trace gravel; grey, (TILL); cohesive, w>PL to w<PL, very stiff SS 29 CONTINUED NEXT PAGE DEPTH SCALE LOGGED: PT

Golder

LOCATION: SEE FIGURE 1

**RECORD OF BOREHOLE:** 17-128

BORING DATE: March 20, 2017

SHEET 2 OF 2

DATUM: Geodetic

Щ	QOH.	SOIL PROFILE	1.		SA	MPLI	_	DYNAMIC PEN RESISTANCE,		ON /0.3m	, , ,		k, cm/s	ONDUCT		Ţ	AL NG	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	SHEAR STREM	IGTH I	nat V. +	30 Q - ●	10 W.		L ONTENT	PERCE	0 <sup>3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
7 7 ≤	BORII	DESCRIPTION	STRAT	DEPTH (m)	NON	_	BLOW	Cu, kPa			Ű - Ŏ 30	Wp				WI 10	Pab	INOTALLATION
- 10		CONTINUED FROM PREVIOUS PAGE						20 2					v 2	3	J 4			
		(SM) SILTY SAND; grey; non-cohesive,	XX	179.88														
		wet, dense		1														
- 11				1	10	ss	38						0					
		END OF BOREHOLE		178.89 11.13														
		Notes:																
		Groundwater encountered during drilling at a depth of 6.1 m below ground																
12		surface.																
		Borehole caved to a depth of 5.8 m below ground surface upon completion of drilling.																
		Groundwater measured at a depth of 5.4 m below ground surface upon completion of drilling.																
13																		
14																		
14																		
15																		
16																		
17																		
18																		
19																		
10																		
- 20																		
DF	PTH	SCALE						Á		olde socia							10	GGED: PT
1:								(3		iolde	r							CKED: SEMP

1:50

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-129

BORING DATE: March 20, 2017

SHEET 1 OF 2 DATUM: Geodetic

CHECKED: SEMP

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) GROUND SURFACE 185.12 TOPSOIL 0.00 (CL) sandy SILTY CLAY, some gravel; SS 4 0 dark brown to brown, mottled, oxidation staining; cohesive, w<PL, firm to stiff GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 2 SS 14 0 (ML) sandy SILT; brown, (TILL), oxidation staining; non-cohesive, moist, compact to very dense SS 18 0 SS 22 5 SS 57 (SP) SAND, some fines; brown, oxidation staining; non-cohesive, wet, CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers SS 6 36 0 SS 37 (CL) sandy SILTY CLAY; grey; cohesive, w<PL, hard SS 35 -430 mm grey, wet, silty sand seam at 8.6 m depth 9 SS 54 0 CONTINUED NEXT PAGE DEPTH SCALE LOGGED: MB Golder

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-129

BORING DATE: March 20, 2017

SHEET 2 OF 2 DATUM: Geodetic

, FE	HOD	SOIL PROFILE	L-		SAI	MPLE		DYNAMIC PENET RESISTANCE, BL		Λ.		ILIC COND , cm/s		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	PIEZOMETER
DEPIH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 SHEAR STRENGT Cu, kPa	60 H nat V. rem V	80	10 <sup>-6</sup> WA <sup>-</sup> Wp <b>I</b>	TER CONTE	10 <sup>-4</sup> 10 <sup>-3</sup> ENT PERCENT	I⊼m	OR STANDPIPE INSTALLATION
	Ď		ST	(111)		-	۵	20 40	60	80	10		30 40		
10		CONTINUED FROM PREVIOUS PAGE (CL) sandy SILTY CLAY; grey; cohesive, w <pl, hard<="" td=""><td>har</td><td></td><td></td><td>+</td><td><math>\dashv</math></td><td></td><td></td><td></td><td></td><td></td><td>+ +</td><td>-</td><td></td></pl,>	har			+	$\dashv$						+ +	-	
		w <pl, hard<="" td=""><td></td><td></td><td>10</td><td>SS</td><td>73</td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td></pl,>			10	SS	73				0				
11		END OF BOREHOLE		174.00 11.13											
				11.13											
40		Notes:  1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface.													
12		Borehole caved to a depth of 8.2 m below ground surface upon completion of drilling.													
13															
14															
15															
16															
17															
18															
19															
20															
DEI	PTH S	SCALE						Ô		der iates					LOGGED: MB

#### RECORD OF BOREHOLE: 17-130

SHEET 1 OF 2

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 21, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER TYPE STANDPIPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW Wp (m) GROUND SURFACE 183.90 FILL - TOPSOIL FILL - (SP) gravelly SAND, some plastic 0.15 50 mm Diameter Monitoring Well SS 5 0 fines; brown, oxidation staining; non-cohesive, wet, loose to compact GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 2 SS 15 (CL) SILTY CLAY; brown; cohesive, w>PL, very stiff SS 19 0 (ML) sandy SILT; brown to grey, (TILL), oxidation staining; non-cohesive, moist, dense to very dense SS 34 5 SS 70 0 179.86 4.04 - auger grinding at 4.0 m depth on cobble or boulder (SM) SILTY SAND; brown, oxidation staining; non-cohesive, wet, compact to CME 55 Trackmount Power Auger SS 29 6 0 Bentonite SS 39 176.82 7.09 (ML) sandy SILT; grey; non-cohesive, wet, dense to very dense
- auger grinding at 7.3 m depth on cobble or boulder SS 41 9 ss 80/ 0.25 - auger grinding at 9.8 m depth on cobble or boulder CONTINUED NEXT PAGE

DEPTH SCALE 1:50

LOGGED: MB **Golder** CHECKED: EW

#### **RECORD OF BOREHOLE:** 17-130

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 21, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp 📙 (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 173.77 10.13 Bentonite (ML) sandy CLAYEY SILT, some gravel; grey, (TILL); cohesive, w<PL, hard CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATAIGINT/1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 10 SS 50/ 0.08 0 Silica Sand and Screen 12 171.58 11 SS 50/ 12.32 S 0.13 END OF BOREHOLE 1. Groundwater encountered during drilling at a depth of 2.9 m below ground surface. 13 14 15 16 17 18 19 20

DEPTH SCALE 1:50

Golder

SHEET 2 OF 2

#### **RECORD OF BOREHOLE:** 17-131

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 22, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW - WI Wp -(m) 60 20 GROUND SURFACE 185.91 TOPSOIL (CL) SILTY CLAY, trace sand, trace 0.15 50 mm Diameter Monitoring Well SS 6 0 gravel; brown, rootlets; cohesive, w~PL, firm GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 185.23 (CL) sandy SILTY CLAY, some gravel; brown, (TILL), sand seams; cohesive, w~PL, stiff 2 SS 12 0 SS 14 3 0 183.70 2.21 (SM/SP) SILTY SAND to SAND, trace fines, trace to some gravel; brown; SS non-cohesive, dry to wet, compact to 30 0 - dry pockets above 2.7 m depth 5 SS 24 0 Bentonite CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers - becoming wet at 4.6 m depth SS 6 36 - oxidation staining above 6.1 m depth SS 43 0 - becoming grey below 7.6 m depth SS 22 Silica Sand and 9 SS 18 0 176.31 9.60 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

Golder

SHEET 1 OF 2

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-131

BORING DATE: March 22, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES **BORING METHOD** DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT 10<sup>-4</sup> 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 1. Groundwater encountered during drilling at a depth of 4.6 m below ground surface. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 11 12 13 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: PT

1:50

Golder Associates CHECKED: EW

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE:** 17-132

DATUM: Geodetic BORING DATE: March 21, 2017

SHEET 1 OF 2

щΤ	dot	SOIL PROFILE			SA	AMPL	ES	DYNAMIC PENET RESISTANCE, BL	RATION OWS/0.3n	1	HYDR	AULIC Co k, cm/s	ONDUCTIVITY	, T	Ğ	DICZOLICZE
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 SHEAR STRENG Cu, kPa	60	80 ``	w	0 <sup>-6</sup> 10 L ATER CO	DNTENT PER	10 <sup>3</sup> LENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	В	GROUND SURFACE	S	187.75			В	20 40	60	80	1	10 2	0 30	40		
0		TOPSOIL	EEE	0.00												
		(CL) SILTY CLAY, trace gravel; brown, organic matter to 0.7 m depth; cohesive, w>PL, firm to stiff		0.12	1	ss	9						0			
1					2	ss	11						0			
		(SP-SM) SAND, fine to medium, some		186.38 1.37												
		fines; brown; non-cohesive, dry to moist, compact			3	ss	21				0					
2						-										
					4	ss	28				0				М	
3																
					5	ss	22					0				
						1										
4				183.71												
	vuger ger	(SM) SILTY SAND; brown; non-cohesive, dense to very dense		4.04												
	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger			1												
	mount F				6	ss	40					0				
5	55 Track					1										
	108 n															
6																
					7	SS	56					0				
						1										$\nabla$
7																21-MAR-17
		-becoming grey at 7.1 m depth		1												
8					8	ss	34					0				
٥																
				1												
9						-										
				178.15	9	SS	43					0				
		END OF BOREHOLE		9.60												
10			-	<del> </del>	-	+-	-	+	-+-		<del> </del>			+		
					<u> </u>						1	1				

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-132

BORING DATE: March 21, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 1. Groundwater encountered during drilling at a depth of 7.6 m below ground surface. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17\_JJL/TB 2. Borehole caved to a depth of 4.3 m below ground surface upon completion of drilling. 11 3. Groundwater measured at a depth of 6.8 m below ground surface upon completion of drilling. 12 13 14 15 16 17 18 19 20

DEPTH SCALE

1:50

LOGGED: PT Golder CHECKED: EW

# **RECORD OF BOREHOLE: 17-133**

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 9, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 191.12 TOPSOIL (CL) sandy SILTY CLAY, trace to some 0.15 SS 8 0 gravel; brown; cohesive, w>PL, firm <u>∑</u> 09-MAR-17 -organic matter between 0.1 m to 0.7 m 2 SS 7 0 3 SS 188.80 (SM) SILTY SAND, some gravel; brown, oxidation staining, (TILL); non-cohesive, SS 23 0 moist, compact 5 SS 27 187.08 4.04 (ML/SM) sandy SILT to SILTY SAND; brown; non-cohesive, moist, compact to വ CME 55 Trackmount Power Auger -oxidation staining above 4.9 m depth SS 45 6 O 108 SS 29 SS 35 0 9 - becoming grey at 9.1 m depth 9 SS 31 0 CONTINUED NEXT PAGE

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

Golder Associates SHEET 1 OF 2

1:50

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-133

BORING DATE: March 9, 2017

SHEET 2 OF 2 DATUM: Geodetic

CHECKED: EW

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10-4 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **I** - WI (m) 60 20 --- CONTINUED FROM PREVIOUS PAGE ---10 180.91 (ML) CLAYEY SILT, some sand, trace gravel; grey, (TILL); cohesive, w<PL, hard GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 10 SS 51 0 11 180.00 END OF BOREHOLE Notes: 1. Borehole caved to a depth of 2.1 m below ground surface upon completion of drilling. 12 2. Groundwater measured at a depth of 0.6 m below ground surface upon completion of drilling. 13 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: AK Golder

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-134

BORING DATE: March 8, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 186.92 FILL - TOPSOIL 08-MAR-17 FILL - (CL) SILTY CLAY, trace sand, 0.15 SS 5 0 trace to some gravel; brown, organic matter, rootlets; cohesive, w<PL, firm GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 186.24 0.69 (CL) SILTY CLAY, some sand, trace to some gravel; brown, oxidation staining; cohesive, w>PL, stiff 2 SS 10 0 SS 12 0 2 (SM) SILTY SAND; brown; non-cohesive, wet, loose to compact SS 6 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 5 SS 7 SS 6 10 0 (SP) gravelly SAND, trace fines; brown, non-cohesive, wet, dense SS 37 d 180.37 6.55 END OF BOREHOLE 1. Borehole caved to a depth of 2.1 m below ground surface upon completion of drilling. 2. Groundwater measured at ground surface upon completion of drilling. 9 10 DEPTH SCALE LOGGED: AK

1:50

Golder CHECKED: EW

#### RECORD OF BOREHOLE: 17-135

SHEET 1 OF 1 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 9, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 187.58 FILL - TOPSOIL 0.00 187.28 SS 5 FILL - (CL) SILTY CLAY, some sand, trace gravel; brown, organic matter; <u>∑</u> 09-MAR-17 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB cohesive, w>PL, firm (CI) sandy SILTY CLAY, trace gravel; brown, oxidation staining; cohesive, w<PL to w>PL, firm to stiff 2 SS 10 SS 0 3 SS 13 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 184.69 2.90 (SP) SAND, some silt, trace gravel to SAND and GRAVEL; brown; non-cohesive, wet, loose to dense 5 SS 6 0 SS 13 6 0 SS 30 0 181.03 6.55 END OF BOREHOLE 1. Borehole caved to a depth of 2.1 m below ground surface upon completion of drilling. 2. Groundwater measured at a depth of 0.6 m below ground surface upon completion of drilling. 9 10

DEPTH SCALE

1:50

Golder

#### **RECORD OF BOREHOLE:** 17-136

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 22, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES HYDRAULIC CONDUCTIVITY, SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -⊖W Wp (m) 60 GROUND SURFACE 185.89 TOPSOIL (ML) sandy SILT, trace gravel, trace clay; 0.15 SS 9 0 brown; non-cohesive, moist, loose GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 185.21 (CL) sandy SILTY CLAY, trace gravel; brown, mottled, organic staining; cohesive, w~PL, stiff to very stiff 2 SS 10 SS 18 0 (CL) sandy SILTY CLAY, some gravel; brown, (TILL), sand seams; cohesive, w~PL, very stiff SS 16 0 3 5 SS 15 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers 22-MAR-17 181.85 4.04 (SP) SAND, some fines; brown to grey; non-cohesive, wet, compact SS 27 6 0 -becoming grey at 6.1 m depth SS 12 SS 25 0 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 4.6 m below ground surface. 9 2. Groundwater measured at a depth of 3.8 m below ground surface upon completion of drilling. 10

DEPTH SCALE 1:50

**Golder** 

SHEET 1 OF 1

#### **RECORD OF BOREHOLE:** 17-137

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 22, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW - WI Wp (m) 60 20 GROUND SURFACE 181.61 TOPSOIL 0.00 (CL) sandy SILTY CLAY; brown, 50 mm Diameter Monitoring Well SS 4 oxidation staining; cohesive, w~PL, firm to stiff GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB - rootlets encountered between 0.1 m and 0.8 m depth 2 SS 8 SS 12 0 (SM) SILTY SAND; brown; non-cohesive, moist to wet, compact to very dense SS 11 5 SS 23 0 МН O CME 55 Trackmount Power Auger 108 mm I.D. Hollow etc. Bentonite SS 13 6 -becoming grey at 5.6 m depth 23 SS 0 SS 51 0 silt layer between 8.6 m and 9.8 m depth 9 ss 50/ 0.08 0 Silica Sand and Screen CONTINUED NEXT PAGE

DEPTH SCALE 1:50

Golder

SHEET 1 OF 2

LOCATION: SEE FIGURE 1

**RECORD OF BOREHOLE:** 17-137

BORING DATE: March 22, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER 10-4 STRATA PLOT 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **I** (m) 60 20 --- CONTINUED FROM PREVIOUS PAGE ---10 (SM) SILTY SAND; brown; non-cohesive, moist to wet, compact to very dense Silica Sand and Screen GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 10 SS 84 0 11 170.49 END OF BOREHOLE 12 13 14 15 16 17 18 19 20

Golder Associates

DEPTH SCALE 1:50

LOGGED: MB CHECKED: EW

#### **RECORD OF BOREHOLE:** 17-138

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 22, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 182.33 TOPSOIL (CL) sandy SILTY CLAY, some gravel; brown, oxidation staining; compact, w~PL to w>PL, firm to stiff 0.15 SS 6 0 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB -rootlets encounterd between 0.7 m and 0.9 m depth 2 SS 11 0 SS 15 180.20 2.13 (SM) SILTY SAND, some gravel; brown; non-cohesive, wet, compact SS 16 179.44 2.90 (ML) sandy SILT, some gravel; brown, (TILL); non-cohesive, moist, compact 5 SS 21 0 - auger grinding at 3.7 m depth on cobble or boulder 178.29 4.04 (SM) SILTY SAND; grey; non-cohesive, wet, compact to dense CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Alliners ∑ 22-MAR-17 SS 11 6 0 -becoming coarser with depth SS 17 0 SS 37 9 SS 25 0 172.73 9.60 END OF BOREHOLE

DEPTH SCALE

1:50

CONTINUED NEXT PAGE

Golder

SHEET 1 OF 2

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-138

BORING DATE: March 22, 2017

SHEET 2 OF 2 DATUM: Geodetic

ا . ال	HOD	SOIL PROFILE			SAI	MPLE		DYNAMIC PENE RESISTANCE, E		.3m	Ι,	k,	cm/s	DUCTIVITY		NG AF	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 SHEAR STRENG Cu, kPa	GTH na	nt V. + m V. ⊕	Q - • U - O	10 <sup>-6</sup> WATI Wp <b>I</b> -	10 <sup>5</sup> ER CONT	10 <sup>-4</sup> ENT PERO →W	10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
- 10		CONTINUED FROM PREVIOUS PAGE						20 40	. 30	. 50					Ĭ		
		Notes:  1. Groundwater encountered during drilling at a depth of 6.1 m below ground surface.															
- 11		Borehole caved to a depth of 5.5 m below ground surface upon completion of drilling.															
		Groundwater measured at a depth of 4.6 m below ground surface upon completion of drilling.															
- 12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
DF	PTH S	CALE								older socia						10	GGED: MB

#### RECORD OF BOREHOLE: 17-139

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 23, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH ⊖W Wp (m) GROUND SURFACE В 183.95 TOPSOIL 0.00 (CL) SILTY CLAY, trace gravel; brown, 0.14 SS 5 0 organic matter, rootlets; w>PL, firm 7 2 SS Ю (CI) SILTY CLAY; brown; cohesive, w>PL, stiff SS 10 - oxidation staining above 2.1 m depth. - becoming grey at of 2.1 m depth. SS 8 0 5 SS 9 0 179.91 4.04 (ML) SILT, some sand, some gravel; grey, (TILL); non-cohesive, moist, compact CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers SS 18 6 SS 30 0 176.79 7.16 (ML/SM) sandy SILT to SILTY SAND; grey; non-cohesive, wet, loose to compact - Samples 8 and 9 distured due to heaving sand SS 4 0 9 9 SS 0 CONTINUED NEXT PAGE DEPTH SCALE Golder Associates

1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

LOGGED: PT CHECKED: EW

SHEET 1 OF 2

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-139

BORING DATE: March 23, 2017

DATUM: Geodetic

SHEET 2 OF 2

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) В --- CONTINUED FROM PREVIOUS PAGE ---10 (ML/SM) sandy SILT to SILTY SAND; grey; non-cohesive, wet, loose to compact GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATAIGINT/1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers 10 SS 10 11 172.37 11.58 (SP) gravelly SAND, some fines; grey; non-cohesive, wet, dense 12 SS 11 31 0 М 171.30 12.65 END OF BOREHOLE Notes: 13 1. Groundwater encountered during drilling at a depth of 7.6 m below ground surface. 2. Groundwater measured at a depth of 5.2 m below ground surface upon completion of drilling. 14 15 16 17 18 19 20 LOGGED: PT

DEPTH SCALE 1:50

**Golder** CHECKED: EW

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE:** 17-140

BORING DATE: March 22 and 23, 2017

SHEET 1 OF 1

DATUM: Geodetic

DESCRIPTION  GROUND SURFACE  TOPSOIL  (CL) SILTY CLAY to sandy SILTY CLAY; brown; cohesive, w~PL to w>PL, firm to very stiff	STRATA PLOT	ELEV. DEPTH (m) 186.84 0.00 0.15	NUMBER	TYPE	BLOWS/0.3m	20 4 SHEAR STREN Cu, kPa	GTH n	0 8 at V. + em V. ⊕	Q - •			ONTENT	PERCENT	——1 ≥ 🛭	PIEZOMETER OR STANDPIPE INSTALLATION
TOPSOIL  (CL) SILTY CLAY to sandy SILTY CLAY; brown; cohesive, w~PL to w>PL, firm to		0.00			- 1	20 4	0 6	0 8		Wr 1		O 3	W 40	Z P	
(CL) SILTY CLAY to sandy SILTY CLAY; brown; cohesive, w~PL to w>PL, firm to					_										
			1	ss	4						0				50 mm Diameter Monitoring Well
			2	ss	11					(	<b>)</b>				
			3	ss	10							0			
			4	ss	17							0			Bentonite
			5	ss	15						0				
	7 4 2	182.80 4.04		-											
	1 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		6	ss	12						0			мн	
	4 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4														Silica Sand and Screen
END OF ROBEHOLE	A 4 7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	180.29 6.55	7	ss	35					0					
Note:  1. Borehole open and dry upon completion of drilling.															
	END OF BOREHOLE  Note:  1. Borehole open and dry upon	(SM) gravelly SILTY SAND; grey, (TILL); non-cohesive, moist, compact to dense  END OF BOREHOLE  Note:  1. Borehole open and dry upon completion of drilling.	(SM) gravelly SILTY SAND; grey, (TILL); non-cohesive, moist, compact to dense  END OF BOREHOLE  Note:  1. Borehole open and dry upon completion of drilling.	(SM) gravelly SILTY SAND; grey, (TILL); non-cohesive, moist, compact to dense    182.80	(SM) gravelly SILTY SAND; grey, (TILL); non-cohesive, moist, compact to dense 6 SS  END OF BOREHOLE  Note:  1. Borehole open and dry upon completion of drilling.	(SM) gravelly SILTY SAND; grey, (TILL); non-cohesive, moist, compact to dense non-cohesive, moist, compact t	(SM) gravelly SILTY SAND; grey, (TILL); and a second content of the second content of th	(SM) gravelly SILTY SAND: grey, (TILL); and the second sec	(SM) gravelly SILTY SAND; grey, (TILL); anon-cohesive, moist, compact to dense (Till) (SM) gravelly SILTY SAND; grey, (TILL); anon-cohesive, moist, compact to dense (Till) (SM) (SM) (SM) (SM) (SM) (SM) (SM) (SM	(SM) gravelly SILTY SAND; grey, (TILL); 182.80 non-cohesive, moist, compact to dense 182.80 6 SS 12 6 SS 12 7 SS 35 END OF BOREHOLE Note: 1. Borehole open and dry upon completion of drilling.	(SM) gravelly SiLTY SAND; grey, (TILL); 102-80  (SM) gravelly SiLTY SAND; grey, (TILL); 103-4-04 104 105-105 1	(SM) gravelly SiLTY SAND: grey, (Til.L); a.04  182.80  6 SS 12  7 SS 35  END OF BOREHOLE Note: 1. Borehole open and dry upon completion of drilling.	(SM) gravelly SILTY SAND, grey, (TILL); non-cohesive, moist, compact to dense (SM) gravelly SILTY SAND, grey, (TILL); at 3 4, 464 (SM) gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, gravelly SILTY SAND, grav	(SM) gravelly SiLTY SAND: grey, (TILL); non-cohesive, moist, compact to dense (SA) (SA) (SA) (SA) (SA) (SA) (SA) (SA)	SM) gravely SILTY SAND; grey, (TILL); and the second state of the

LOCATION: SEE FIGURE 1

#### RECORD OF BOREHOLE: 17-141

SHEET 1 OF 2

BORING DATE: March 7, 2017

DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 GROUND SURFACE 190.16 TOPSOIL becoming (CL) SILTY CLAY; brown, rootlets; cohesive, w<PL, firm SS 6 0 (ML) sandy CLAYEY SILT, some gravel; brown, rootlets and organic matter to 1.4 m depth; cohesive, w~PL t w<PL, firm 2 SS 7 SS 0 188.03 2.13 (ML) sandy SILT, some gravel; grey; non-cohesive, moist, compact to dense SS 28 0 - auger grinding at 2.7 m depth on cobble or boulder 5 SS 22 0 - becoming grey at 3.4 m depth CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 13 6 0 - auger grinding at 5.2 m depth on cobble or boulder SS 32 0 SS 17 0 181.63 8.53 (SP) SAND, some fines, trace gravel; grey; non-cohesive, wet, very loose to dense 9 - Samples 9 and 11 disturbed due to heaving sand ss wh 0 08-MAR-17 CONTINUED NEXT PAGE

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

LOGGED: AP Golder CHECKED: EW

LOCATION: SEE FIGURE 1

#### **RECORD OF BOREHOLE:** 17-141

BORING DATE: March 7, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 (SP) SAND, some fines, trace gravel; grey; non-cohesive, wet, very loose to dense GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIMICLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17\_JUL/TB CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 10 SS 26 0 11 - becoming coarser at 11.7 m depth 12 SS 11 0 177.51 12.65 END OF BOREHOLE Notes: 13 1. Groundwater encountered during drilling at a depth of 9.1 m below ground surface. 2. Borehole caved to a depth of 9.3 m below ground surface upon completion of drilling. 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: AP **Golder** 

1:50

CHECKED: EW

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

DEPTH SCALE

1:50

# **RECORD OF BOREHOLE: 17-142**

SHEET 1 OF 2

LOGGED: AK

CHECKED: EW

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 8, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH OW. Wp (m) GROUND SURFACE 191.7 TOPSOIL 0.00 (CL) sandy SILTY CLAY, trace gravel; 0.18 SS 8 brown, organic matter, rootlets; cohesive, w>PL to w<PL, stiff 2 SS 11 0 (ML) sandy SILT; brown, oxidation staining; non-cohesive, wet, compact SS 10 - 2 mm sand seam encountered at 1.8 m SS 13 lo (ML) sandy SILT, some gravel; brown, (TILL); non-cohesive, moist, compact to dense 5 SS 19 - becoming grey at 4.0 m depth CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 6 15 0 ∑ 08-MAR-17 SS 31 (SM) SILTY SAND, trace gravel; grey; non-cohesive, wet, compact to dense - Sample 8 disturbed due to heaving sand SS 10 МН 9 9 SS 22 0 CONTINUED NEXT PAGE

**Golder** 

LOCATION: SEE FIGURE 1

## **RECORD OF BOREHOLE:** 17-142

BORING DATE: March 8, 2017

SHEET 2 OF 2 DATUM: Geodetic

LE.	НОБ	SOIL PROFILE	1.		SAI	MPLE	-	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	n \	HYDRAU k,	LIC CONDU cm/s	NG NG	PIEZOMETER	
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	ТҮРЕ	BLOWS/0.3m	20 40 60 SHEAR STRENGTH nat V. Cu, kPa rem V		Wp I	ER CONTE		ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
10		CONTINUED FROM PREVIOUS PAGE (SM) SILTY SAND, trace gravel; grey; non-cohesive, wet, compact to dense						20 40 60	80	10	20	30 40		
11	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger				10	SS	33				0			
12	CME 108			179.06	11	SS	53				0			
13		END OF BOREHOLE  Notes:  1. Borehole caved to a depth of 9.8 m below ground surface upon completion of drilling.		12.65										
14		Groundwater measured at a depth of 5.8 m below ground surface upon completion of drilling.												
15														
16														
17														
18														
19														
20														
DE	PTH S	CALE	1				1	Gol	lder	1	ı		LC	GGED: AK

1:50

LOCATION: SEE FIGURE 1

### RECORD OF BOREHOLE: 17-143

BORING DATE: March 22, 2017

SHEET 1 OF 1 DATUM: Geodetic

CHECKED: EW

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) 60 20 GROUND SURFACE 184.50 FILL - (CL) SILTY CLAY, some sand; brown, organic matter, rootlets; cohesive, w>PL, firm SS 7 0 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 183.82 (CI) SILTY CLAY, some sand; brown, oxidation staining; cohesive, w<PL, stiff 2 SS 10 SS 14 0 -3 SS 7 181.61 2.90 (ML) sandy SILT, some gravel; grey, (TILL); non-cohesive, moist, compact SS 15 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Augers SS 17 6 0 (SM) SILTY SAND; grey; non-cohesive, ∑ 22-MAR-17 SS 32 0 (ML) sandy CLAYEY SILT, some gravel; grey, (TILL); cohesive, w<PL, hard SS 39 0 END OF BOREHOLE Notes: 1. Borehole caved to a depth of 7.0 m below ground surface upon completion of drilling. 9 2. Groundwater measured at a depth of 6.1 m below ground surface upon completion of drilling. 10 DEPTH SCALE LOGGED: MB Golder

### RECORD OF BOREHOLE: 17-144

SHEET 1 OF 2 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 22, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) GROUND SURFACE 184.17 TOPSOIL 0.00 (CI) SILTY CLAY, trace to some sand; 0.14 SS 6 0 brown, mottled, oxidation staining; cohesive, w~PL to w>PL, firm to very GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 2 SS 10 SS 18 0 (ML) sandy CLAYEY SILT, some gravel; brown to grey, (TILL); cohesive, w<PL, SS 18 0 - auger grinding at 2.2 m depth on cobble or boulder 5 SS 15 0 180.13 4.04 (ML) sandy SILT, some gravel; grey, (TILL); non-cohesive, moist, compact to CME 55 Trackmount Power Auger SS 21 6 0 SS 28 0 - 0.45 m grey, wet, silty sand layer at 7.6 m depth SS 16 ∑ 22-MAR-17 - auger grinding at 8.5 m depth on cobble or boulder 9 9 SS 38 0

DEPTH SCALE

1:50

CONTINUED NEXT PAGE

Golder

LOGGED: MB

CHECKED: EW

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-144

BORING DATE: March 22, 2017

SHEET 2 OF 2

DATUM: Geodetic

	HOD	SOIL PROFILE			SAI	MPLI	_	RESISTANCE,	PENETRATION CE, BLOWS/0.3m			HYDRAULIC CONDUCTIVITY, k, cm/s					NG <sup>A</sup>	PIEZOMETER
DEPIH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	20 4 SHEAR STREM Cu, kPa			80 - Q - ● 9 U - ○		ATER CO		PERCE	0 <sup>3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
ב	BO		STR	(m)	z		BLC				80	Wr 1				10		
10		CONTINUED FROM PREVIOUS PAGE	Jean	,														
		(SP) gravelly SAND; grey; non-cohesive,	4 4	174.04 10.13														
		wet, dense	• •															
					10	ss	36					0						
11		END OF BOREHOLE		173.05 11.13														
		Notes:																
		Borehole caved to a depth of 9.8 m																
		below ground surface upon completion of drilling.																
12		_																
		Groundwater measured at a depth of 8.5 m below ground surface upon completion of drilling.																
13																		
14																		
15																		
15																		
16																		
17																		
18																		
19																		
20																		
-0																		
		<u> </u>	1								1					1		
DEI	PTH S	CALE							) As								LO	GGED: MB

# **RECORD OF BOREHOLE: 17-145**

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 23, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 192.75 FILL - OPSOIL 0.00 FILL - (CL) sandy SILTY CLAY; brown, rootlets; cohesive, w~PL, firm 0.18 SS 7 0 192.06 (CL) SILTY CLAY, some sand; brown, rootlets; cohesive, w>PL, firm 2 SS 4 0 (ML) sandy SILT, some gravel; brown, oxidation staining, (TILL); non-cohesive, moist, compact SS 10 SS 17 0 189.86 (CL) SILTY CLAY, some sand, some gravel; grey, (TILL); cohesive, w<PL, hard SS 62 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger - auger grinding between 4.3 m and 4.6 m on boulder - auger grinding between 4.6 m and 5.5 SS 6 49 m on boulder 0 SS 54 ss 65/ 0.28 - SPT hammer bouncing at 8.1 m depth SS 50/ 0.10 9 END OF BOREHOLE CONTINUED NEXT PAGE

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH LAND HOLDINGS INCIYORK DOWNS GOLF COURSEI02 DATA/GINT/1413472 2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB

DEPTH SCALE

1:50

Golder Associates SHEET 1 OF 2

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-145

BORING DATE: March 23, 2017

DATUM: Geodetic

SHEET 2 OF 2

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-4</sup> BLOWS/0.3m 10<sup>-5</sup> 10<sup>-3</sup> STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 1. Borehole caved to a depth of 7.9 m below ground surface upon completion of drilling. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 2. Borehole dry upon completion of drilling. 11 12 13 14 15 16 17 18 19 20

DEPTH SCALE 1:50

Golder Associates

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE: 17-146**

SHEET 1 OF 1

DATUM: Geodetic

BORING DATE: March 7, 2017

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 195.79 TOPSOIL 0.00 1A 51.8 195.44 0.35 SS 6 (CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, w>PL to w~PL, 1B firm to stiff SS 13 2A 0 194.77 (ML) sandy SILT, trace gravel; brown; non-cohesive, moist, compact 2B 0 SS 19 2 07-MAR-17 - becoming grey at 2.4 m depth SS 21 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 5 SS 21 - sand and gravel seam at 3.4 m depth SS 24 6 0 (SM) SAND; grey; non-cohesive, wet, SS 32 0 189.24 6.55 END OF BOREHOLE 1. Groundwater encountered during drilling at a depth of 3.4 m below ground surface. 2. Borehole caved to a depth of 4.1 m below ground surface upon completion of drilling. 3. Groundwater measured at a depth of 2.3 m below ground surface upon completion of drilling. 9 10

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

Golder
Associates

LOGGED: AP
CHECKED: EW

1:50

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-147

BORING DATE: March 24, 2017

SHEET 1 OF 2 DATUM: Geodetic

CHECKED: EW

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SAMPLES SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 20 GROUND SURFACE 194.62 FILL - TOPSOIL FILL - (CL) SILTY CLAY, some sand, 0.15 50 mm Diameter Monitoring Well SS 6 0 trace gravel; brown, rootlets, organic matter; cohesive, firm GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 193.93 (CL) sandy SILTY CLAY, trace gravel; light brown; non-cohesive, wet, dense 2 SS 48 0 193.27 (CL-ML) SILTY CLAY to CLAYEY SILT, some sand, trace to some gravel; brown, (TILL); cohesive, w<PL, very stiff to hard SS 41 0 - oxidation staining above 2.0 m depth - becoming grey at 2.3 m depth SS 62 0 5 SS 26 o CME 55 Trackmount Power Auger 108 mm I.D HAILAN Bentonite SS 6 46 0 SS 65 SS 34 9 9 SS 46 0 Silica Sand and Screen CONTINUED NEXT PAGE DEPTH SCALE LOGGED: MB Golder

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-147

BORING DATE: March 24, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 20 --- CONTINUED FROM PREVIOUS PAGE ---10 (CL-ML) SILTY CLAY to CLAYEY SILT, some sand, trace to some gravel; brown, (TILL); cohesive, w<PL, very stiff to hard Silica Sand and GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 10 SS 66 11 183.49 11.13 END OF BOREHOLE Note: 1. Groundwater encountered during drilling at a depth of 0.8 m below ground surface. 12 13 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: MB

1:50

Golder

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

DEPTH SCALE

1:50

# **RECORD OF BOREHOLE: 17-148**

SHEET 1 OF 2

LOGGED: PT

CHECKED: EW

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 24, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES HYDRAULIC CONDUCTIVITY, SOIL PROFILE BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) GROUND SURFACE 193.20 FILL - TOPSOIL 0.00 FILL - (CI) SILTY CLAY; brown, organic SS 7 0 matter, oxidation staining; cohesive, w>PL to w~PL, firm 2 SS 6 3 SS 6 0 191.07 2.13 (CL) SILTY CLAY, trace sand, trace gravel; brown, (TILL), oxidation staining; cohesive, w>PL to w<PL, stiff SS 12 0 5 SS 9 0 189.16 4.04 (SP) SAND, trace fines; grey; non-cohesive, wet, dense CME 55 Trackmount Power Auger 108 mm I.D. Hallow: ?: SS 45 188.32 4.88 6B (CL) SILTY CLAY, trace sand, trace gravel; grey, (TILL); cohesive, w<PL, hard 0 187.56 5.64 (SP) SAND, trace fines; grey; non-cohesive, wet, very dense 7A 0 (CL) SILTY CLAY, trace sand, trace SS 73 7B 0 gravel; grey, (TILL); cohesive, w<PL, hard SS 86 0 9 9 SS 62 0 CONTINUED NEXT PAGE

**Golder** 

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-148

BORING DATE: March 24, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING PIEZOMETER DEPTH SCALE METRES 10-4 STRATA PLOT 10<sup>-5</sup> 10<sup>-3</sup> BLOWS/0.3m STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 20 --- CONTINUED FROM PREVIOUS PAGE ---10 (CL) SILTY CLAY, trace sand, trace gravel; grey, (TILL); cohesive, w<PL, hard GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURYICAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 10 SS 61 0 11 182.08 11.13 END OF BOREHOLE Notes: 1. Groundwater encountered during drilling at a depth of 4.6 m below ground surface. 12 2. Borehole caved to a depth of 4.6 m below ground surface upon completion of drilling. 13 14 15 16 17 18 19 20

DEPTH SCALE 1:50

Golder

#### RECORD OF BOREHOLE: 17-149

SHEET 1 OF 1

LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 7, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SAMPLES HYDRAULIC CONDUCTIVITY, SOIL PROFILE **BORING METHOD** ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER TYPE STANDPIPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION INSTALLATION DEPTH -OW - wi Wp I (m) 60 GROUND SURFACE 196.63 TOPSOIL 0.00 1A 0 196.32 SS 7 (CL) SILTY CLAY, some sand, some gravel; brown, rootlets; cohesive, w~PL, firm 1B 0 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB (ML) sandy SILT, some gravel, some to trace plastic fines; brown, (TILL); non-cohesive, moist, compact to very 2 SS 21 0 dense SS 3 - becoming grey at 1.8 m depth -auger grinding at 2.0 m depth on cobble or boulder SS 26 0 5 SS 34 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger 07-MAR-17 -auger grinding at 3.7 m depth on cobble or boulder 192.59 4.04 (ML) SILT, some sand; grey; non-cohesive, moist, dense SS 6 45 0 (ML) sandy SILT, some gravel; grey, (TILL); non-cohesive, moist, dense to very dense - auger grinding at 6.7 m depth on cobble or boulder SS 45 0 8 SS 50/ 0.10 0 188.77 7.86 END OF BOREHOLE Notes: 1. Borehole caved to a depth of 5.2 m below ground surface upon completion of drilling. 2. Groundwater measured at a depth of 3.4 m below ground surface upon completion of drilling. 9 10

DEPTH SCALE

1:50

LOGGED: AP **Golder** CHECKED: EW

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-150

SHEET 1 OF 2

BORING DATE: March 24, 2017

DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp (m) 60 GROUND SURFACE 195.80 FILL - (CL) SILTY CLAY, some sand; brown; cohesive, w>PL, firm SS 4 0 GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB 195.11 0.69 (CL) SILTY CLAY, some sand; brown, oxidation staining; cohesive, w>PL, stiff 2 SS 14 0 (ML) sandy SILT, some gravel; brown, (TILL); moist, compact to very dense SS 25 2 - oxidation staining abve 2.1 m depth - becoming grey at 2.1 m depth SS 56 0 ss 50/ 0.10 5 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger SS 50/ 0.13 6 0 SS 46 0 SS 77 9 9 SS 74 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

LOGGED: MB Golder CHECKED: EW

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-150

BORING DATE: March 24, 2017

SHEET 2 OF 2 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-4</sup> BLOWS/0.3m 10<sup>-5</sup> 10<sup>-3</sup> STANDPIPE INSTALLATION NUMBER TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) 60 --- CONTINUED FROM PREVIOUS PAGE ---10 1. Borehole caved to a depth of 8.2 m below ground surface upon completion of drilling. GTA-BHS 001 \\GOLDER.GDS\GAL\SUDBURY\CAD-GIS\SIM\CLIENTS\SIXTEENTH\_LAND\_HOLDINGS\_INC\YORK\_DOWNS\_GOLF\_COURSE\\02\_DATA\GINT\1413472\_2017.GPJ GAL-MIS.GDT 10/17/17 JJL/TB 2. Borehole dry upon completion of drilling. 11 12 13 14 15 16 17 18 19 20 DEPTH SCALE LOGGED: MB Golder Associates

1:50

CHECKED: EW

LOCATION: SEE FIGURE 1

# **RECORD OF BOREHOLE: 17-151**

BORING DATE: March 23, 2017

SHEET 1 OF 1

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE	1.	_	SAMP	_	DYNAMIC PENET RESISTANCE, BL	RATION .OWS/0.3m	1	HYDRAULIC COND k, cm/s		T NG NG	PIEZOMETER
TRES	MET		STRATA PLOT	ELEV.	띪	BLOWS/0.3m	20 40	60	80 `	10 <sup>-6</sup> 10 <sup>-5</sup>	10 <sup>-4</sup> 10 <sup>-3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE
ME	ZING	DESCRIPTION	ATA	DEPTH	NUMBER	/SMC	SHEAR STRENG Cu, kPa	TH nat V. rem V.	+ Q- ● Đ U- ○	WATER CONTI		VB. T	INSTALLATION
<u>د</u>	BOF		STR	(m)	Ž	BLC	20 40	60	80	Wp <b>I</b>	30 40	^ _	
0		GROUND SURFACE		196.11							i i		
U		(CL) sandy SILTY CLAY; dark brown, organic matter, rootlets; cohesive, w~PL		0.00									
		firm	·		1 SS	5 5				þ			
				195.42									
		(CL-ML) sandy SILTY CLAY to sandy CLAYEY SILT; brown, (TILL); cohesive,		0.69									
1		w <pl, hard<="" stiff="" td="" to="" very=""><td></td><td></td><td>2 SS</td><td>16</td><td></td><td></td><td></td><td>9</td><td></td><td></td><td></td></pl,>			2 SS	16				9			
				1									
					3 SS	22							
						' '							
2													
				1	$\dashv$								
					4 SS	32							
				1	$\dashv$								
3				1	_								
					5 SS	75/ 0.18							
	Auger			1									
	CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Auger												
4	ow St												
·	ackmo	- becoming grey at 4.0 m depth											
	55 Tra												
	CME 108 n			1									
					6 SS	57				0			
5				1									
6													
					7 SS	60							
7													
		- sand seams below 7.6 m depth			8 SS	5 50							
8				188.03									
		END OF BOREHOLE		8.08									
		Note:											
		Borehole open and dry upon											
9		Borehole open and dry upon completion of drilling.											
3													
10													
								<u> </u>					
DE	PTH S	SCALE					Â	Gold Associ	274			LC	GGED: MB
1:	E0						( <i>1</i> )	F GOID	er				ECKED: EW

### **RECORD OF BOREHOLE:** 17-152

SHEET 1 OF 2 LOCATION: SEE FIGURE 1 DATUM: Geodetic BORING DATE: March 24, 2017 DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m  $\begin{array}{c} \text{HYDRAULIC CONDUCTIVITY,} \\ \text{k, cm/s} \end{array}$ SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 10<sup>-5</sup> 10<sup>-4</sup> 10<sup>-3</sup> BLOWS/0.3m NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -<del>0</del>W Wp (m) 60 20 GROUND SURFACE 192.26 FILL - (CL) sandy SILTY CLAY; brown, rootlets, organic matter; cohesive, w>PL, SS 4 0 191.57 0.69 (CL-ML) SILTY CLAY to SILTY CLAYEY SILT, some sand, some gravel; brown, oxidation staining; cohesive, w<PL, stiff 2 SS 9 0 SS 0 190.13 (ML) Sandy SILT, some gravel, (TILL); non-cohesive, moist, very dense ss 50/ 4 0 - auger grinding at 2.7 m depth on cobble or boulder 189.52 2.74 (SM) SILTY SAND, trace gravel; (TILL); non-cohesive, moist, dense to very SS 65 0 CME 55 Trackmount Power Auger 108 mm I.D. Hollow Stem Austral ∑ 24-MAR-17 6 ss 50/ SS 39 lo SS 56 0 9 9 SS 35 182.66 END OF BOREHOLE CONTINUED NEXT PAGE

DEPTH SCALE 1:50

GTA-BHS 001 NGOLDER.GDSIGALISUDBURYICAD-GISISIMICLIENTSISIXTEENTH\_LAND\_HOLDINGS\_INCIYORK\_DOWNS\_GOLF\_COURSEI02\_DATA/GINT1/413472\_2017.GPJ\_GAL-MIS.GDT\_10/17/17 JJL/TB

LOGGED: MB Golder CHECKED: EW

LOCATION: SEE FIGURE 1

### **RECORD OF BOREHOLE:** 17-152

BORING DATE: March 24, 2017

SHEET 2 OF 2 DATUM: Geodetic

ا پِ	НОР	SOIL PROFILE			SA	MPLE	≣S	DYNAMIC PENETRA RESISTANCE, BLOV	TION /S/0.3m	HYDRAULIC CONE k, cm/s		일	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 SHEAR STRENGTH Cu, kPa	nat V. + Q - ● rem V. ⊕ U - ○  60 80	10 <sup>-6</sup> 10 <sup>-5</sup> WATER CONT Wp   10 20	10 <sup>4</sup> 10 <sup>3</sup>	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
- 10		CONTINUED FROM PREVIOUS PAGE Notes:									00 40		
		Groundwater encountered during drilling at a depth of 4.6 m below ground surface.											
11		Borehole caved to a depth of 7.3 m below ground surface upon completion of drilling.											
		Groundwater measured at a depth of 4.6 m below ground surface upon completion of drilling.											
12													
13													
14													
15													
16													
17													
18													
19													
20													
	PTH S	CALE	1	1					Golder ssociates	1 1		100	GGED: MB

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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